Appl No 10/086,250, Filed March 4, 2002
Dkt No 1744 0140006, Group Art Unit 2681
Inventors Sorrells *et al*, Tel 202/371-2600
Title Applications of Universal Frequency Translation

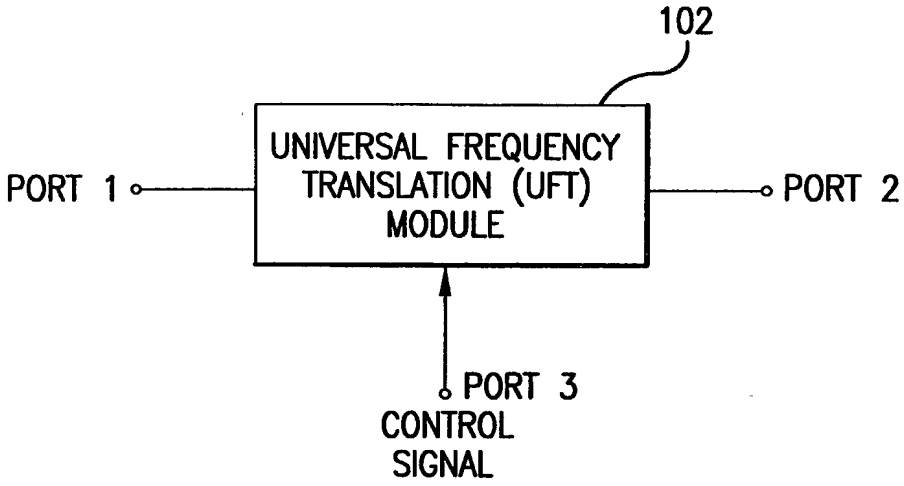

FIG. 1A

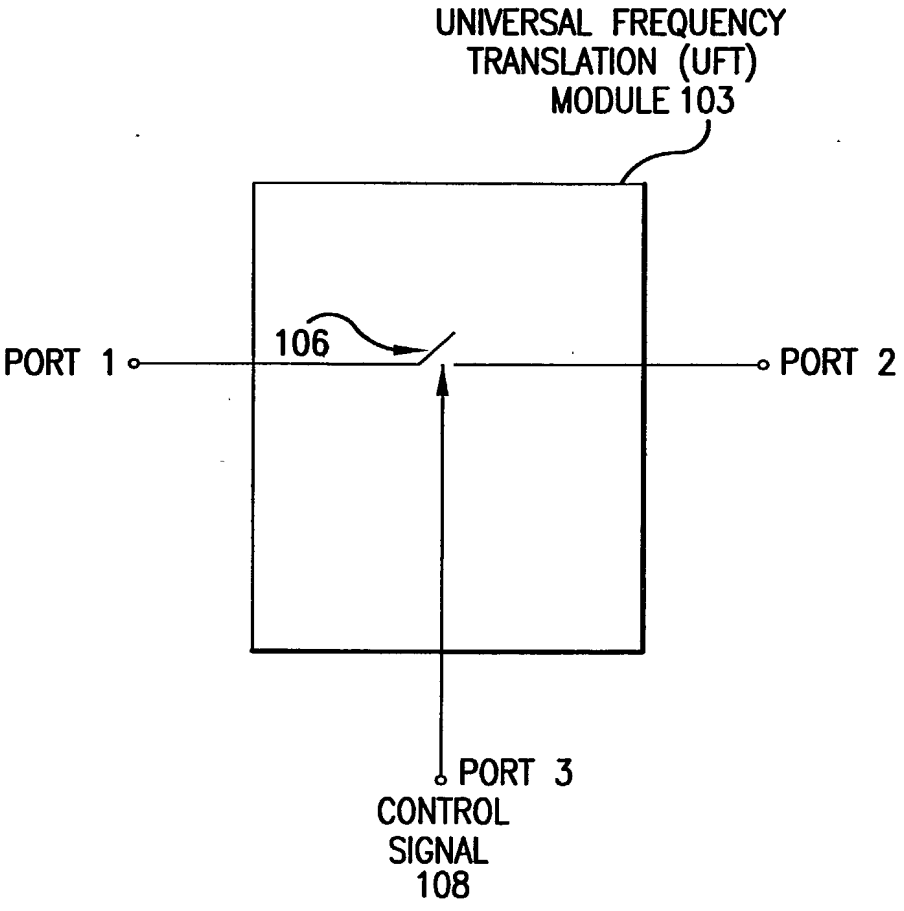

FIG. 1B

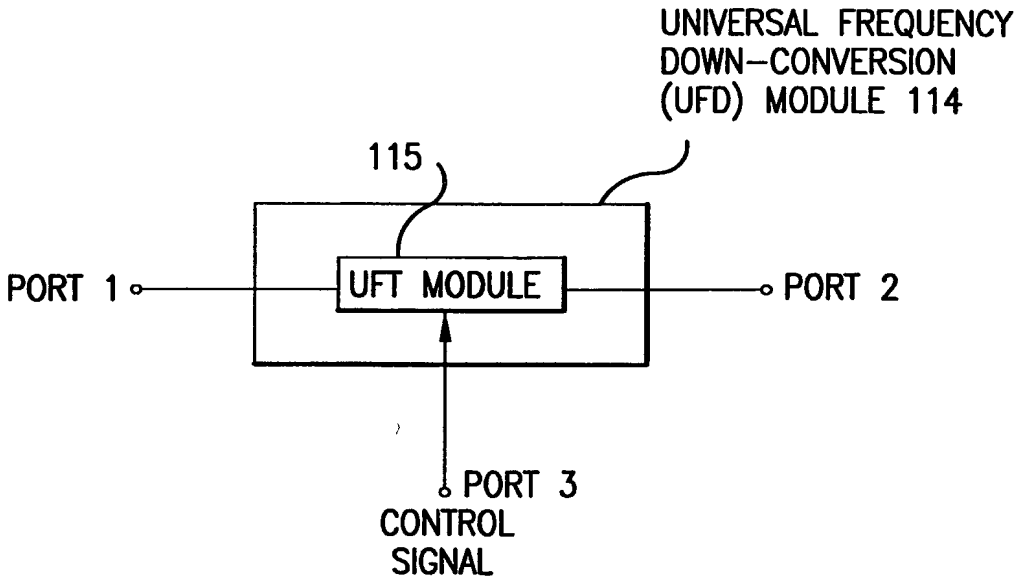
UNIVERSAL FREQUENCY
DOWN-CONVERSION
(UFD) MODULE 114
115
PORT 1
UFT MODULE
PORT 2
PORT 3
CONTROL
SIGNAL

FIG. 1C

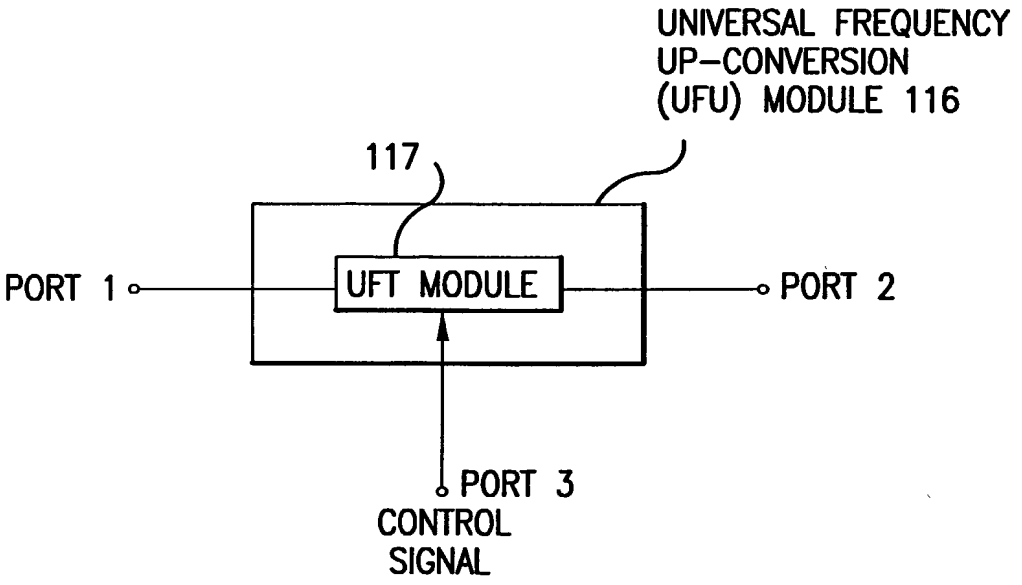
UNIVERSAL FREQUENCY
UP-CONVERSION
(UFU) MODULE 116
117
PORT 1
UFT MODULE
PORT 2
PORT 3
CONTROL
SIGNAL

FIG. 1D

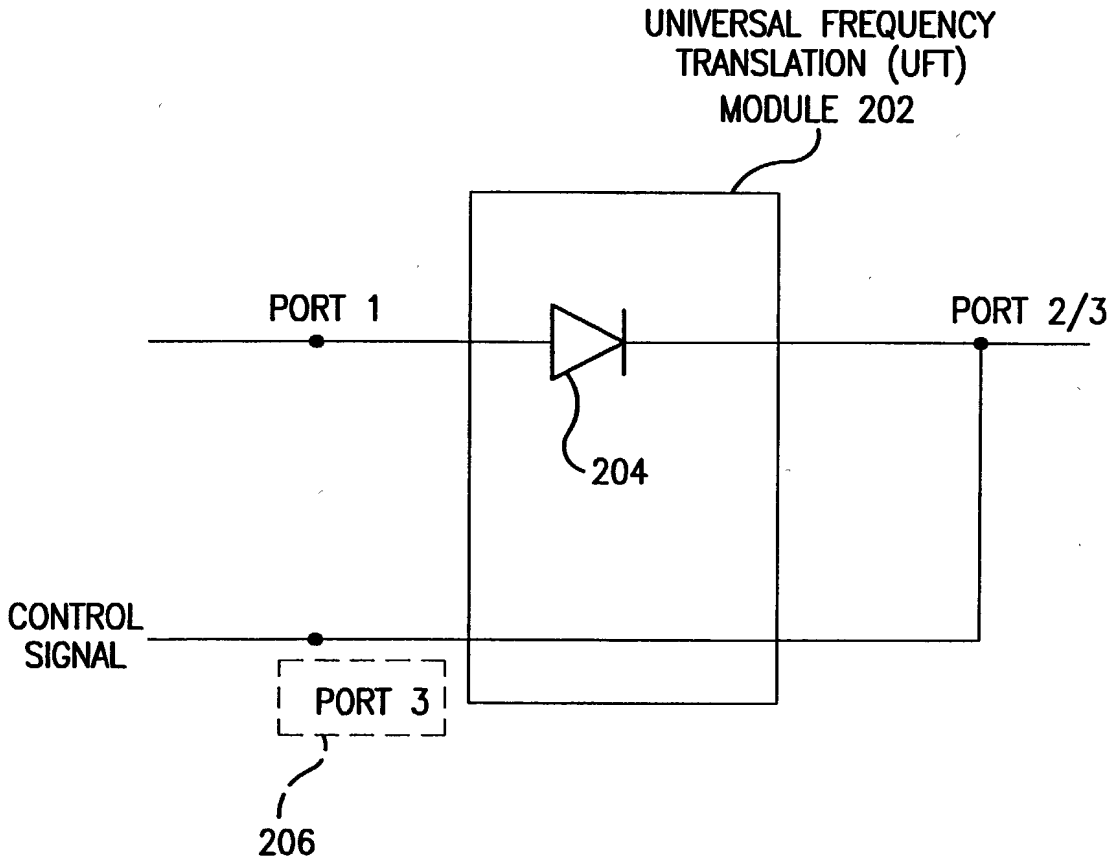
UNIVERSAL FREQUENCY
TRANSLATION (UFT)
MODULE 202
PORT 1
PORT 2/3
204
CONTROL
SIGNAL
PORT 3
206

FIG. 2

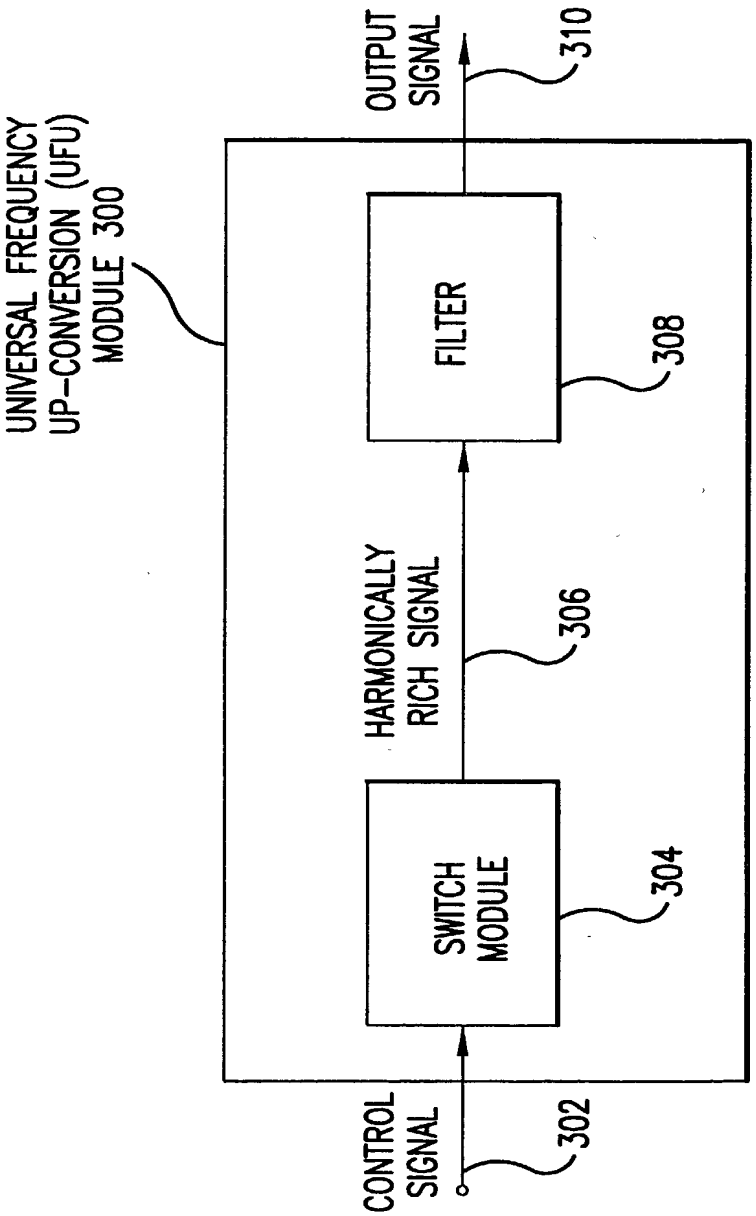
UNIVERSAL FREQUENCY
UP-CONVERSION (UFU)
MODULE 300
OUTPUT
SIGNAL
310
FILTER
308
HARMONICALLY
RICH SIGNAL
306
SWITCH
MODULE
304
CONTROL
SIGNAL
302

FIG. 3

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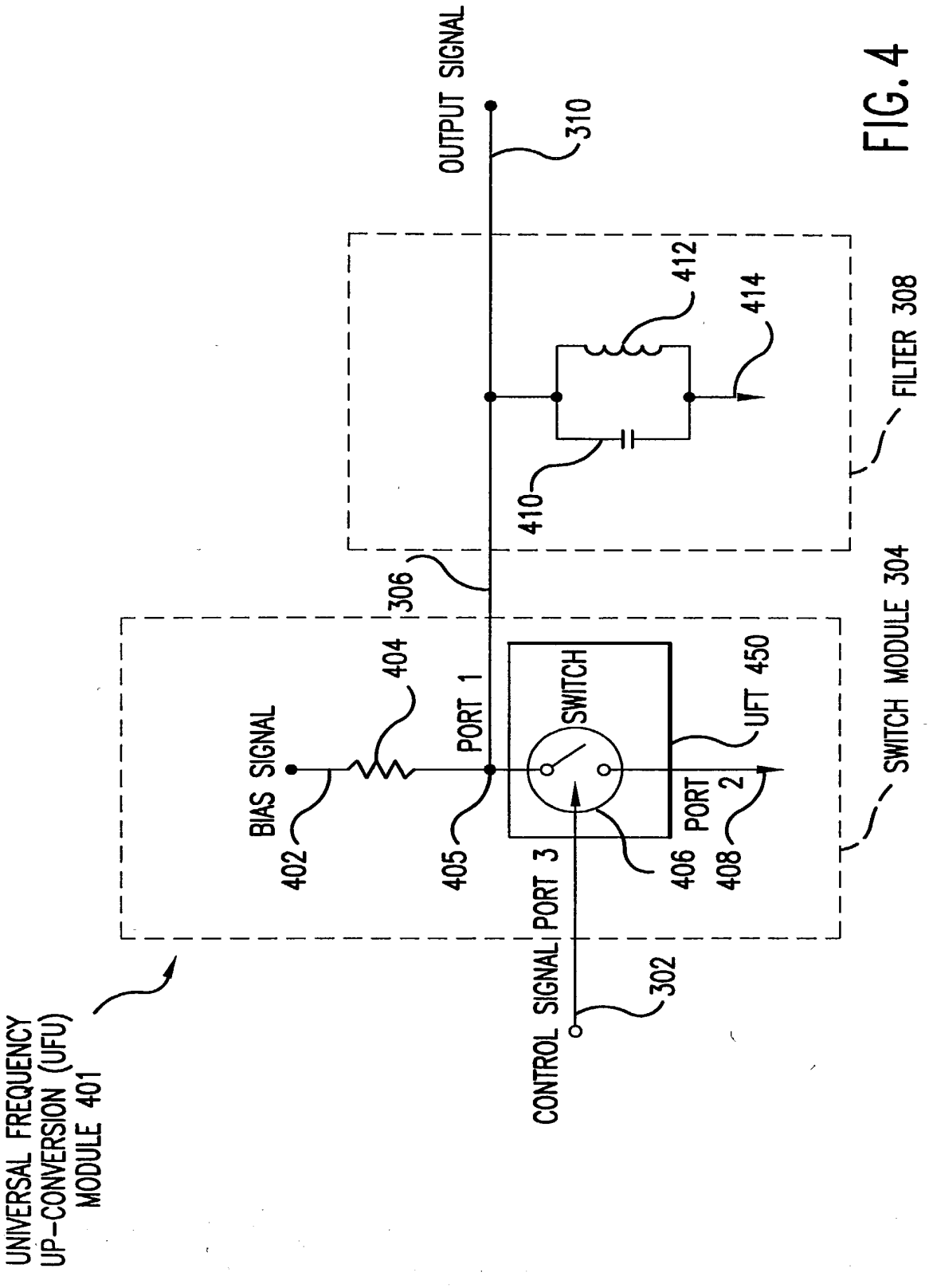

FIG. 4

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Dkt No 1744 0140006, Group Art Unit 2681
Inventors Sorrells *et al* , Tel 202/371-2600
Title Applications of Universal Frequency Translation

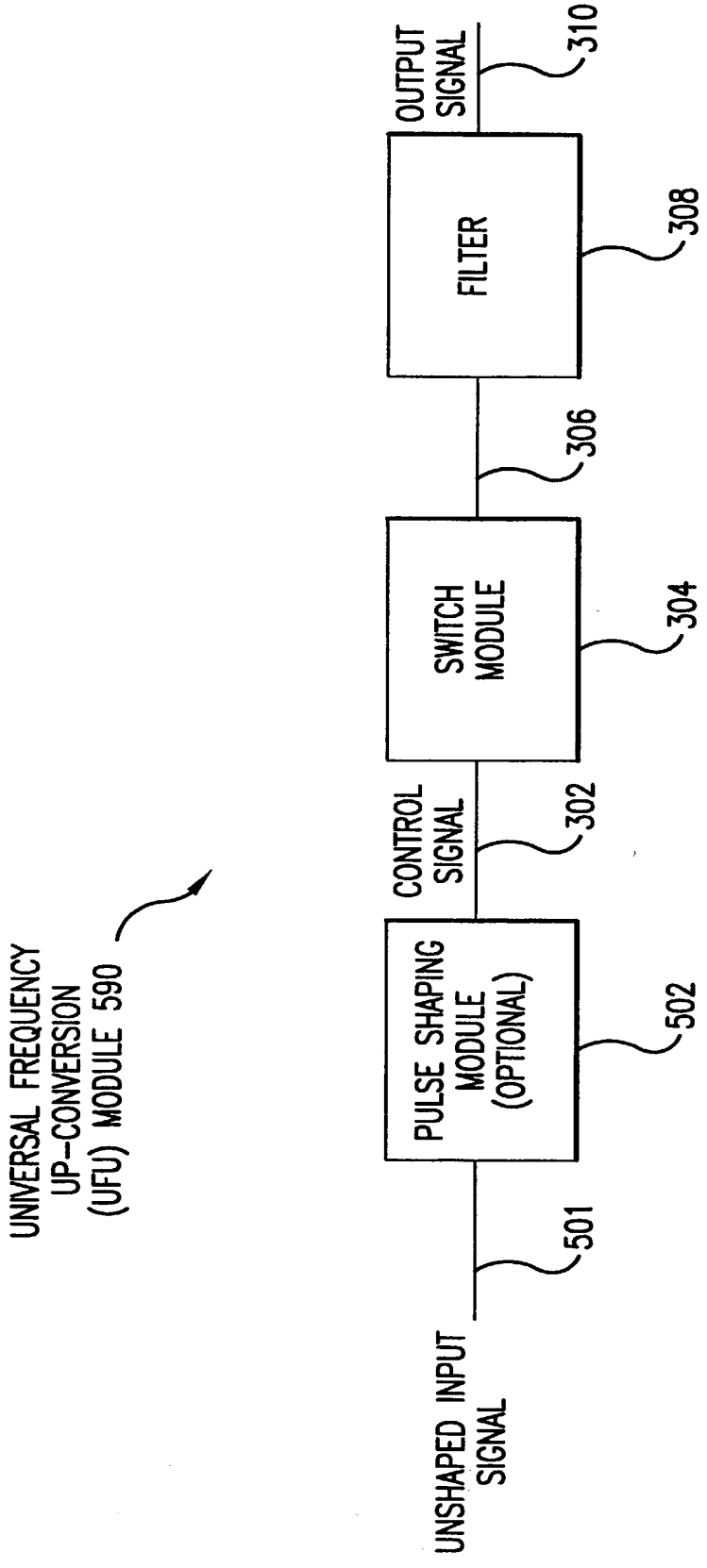

FIG. 5

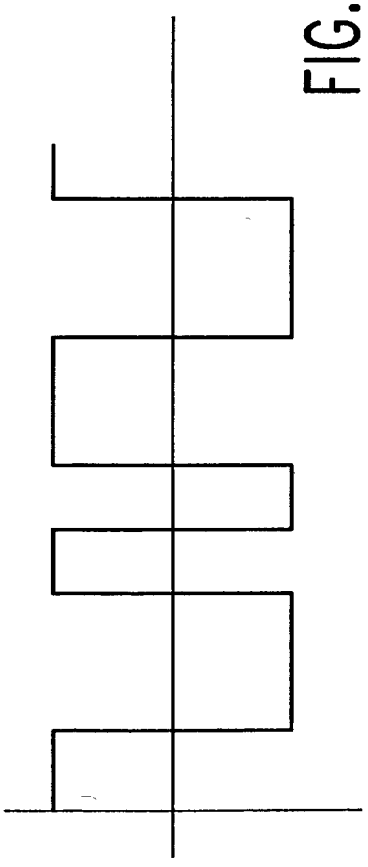

FIG. 6A

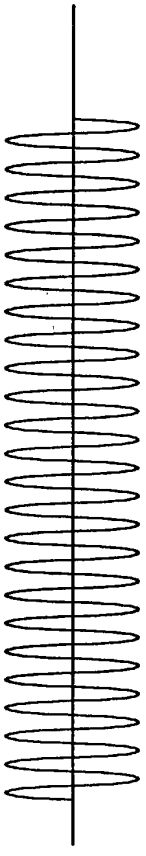

FIG. 6B

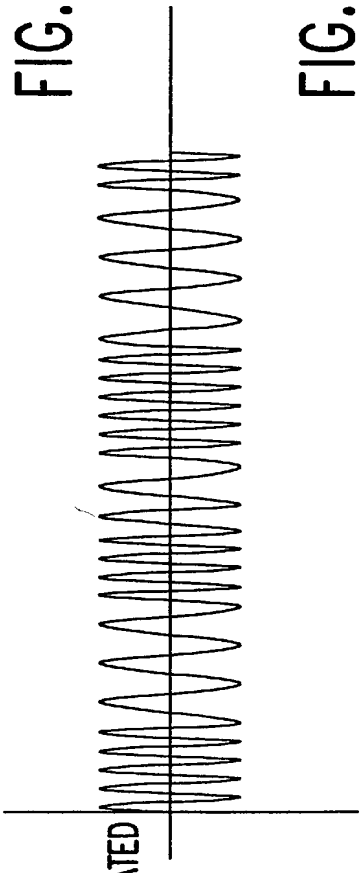

FIG. 6C

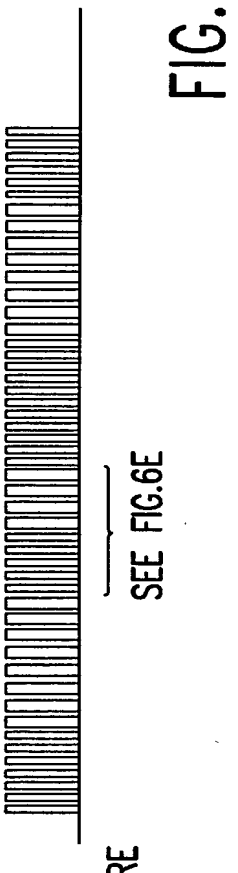

FIG. 6D

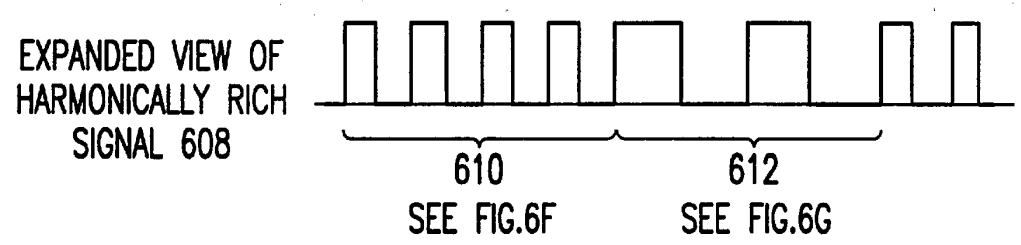

FIG. 6E

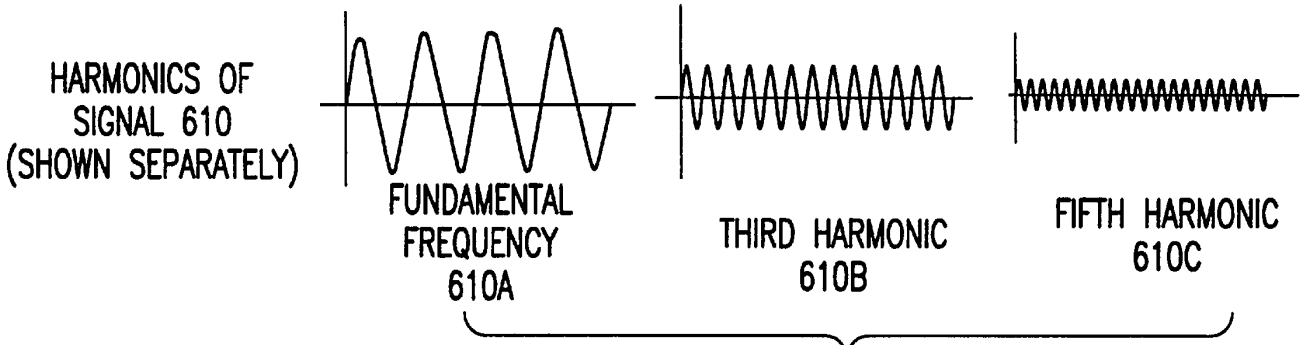

FIG. 6F

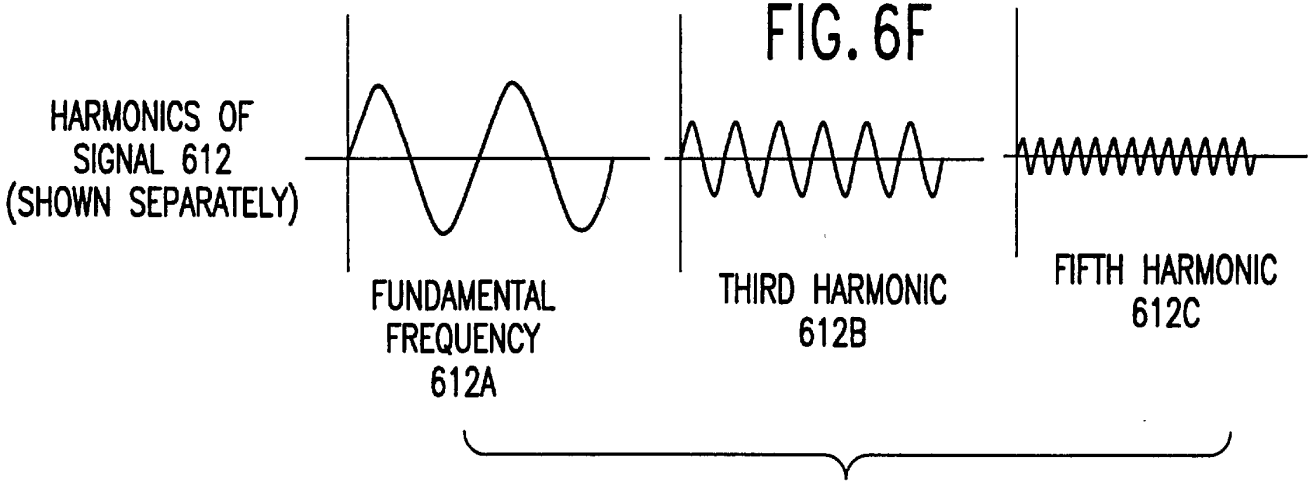

FIG. 6G

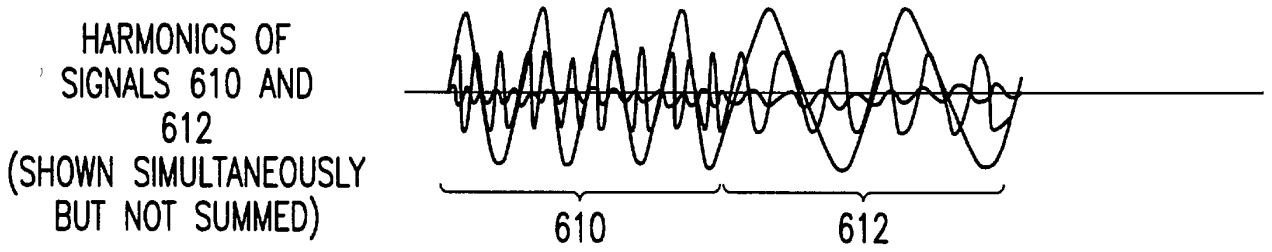

FIG. 6H

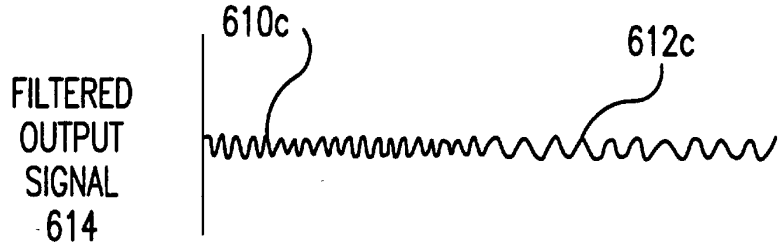

FIG. 6I

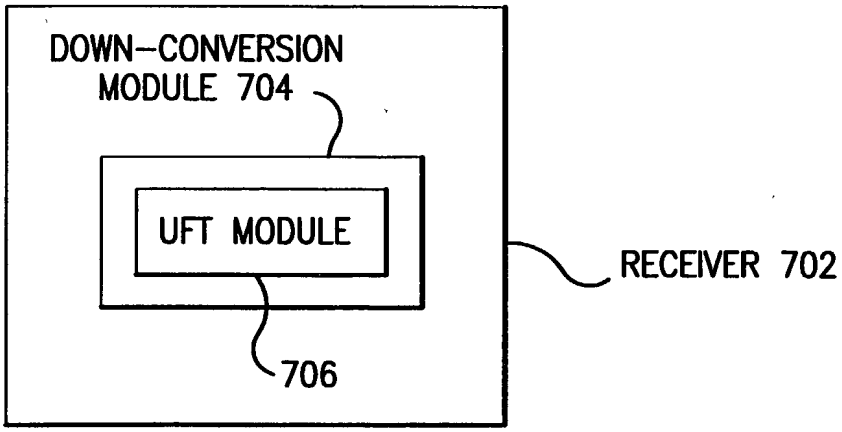
DOWN-CONVERSION
MODULE 704
UFT MODULE
706
RECEIVER 702

FIG. 7

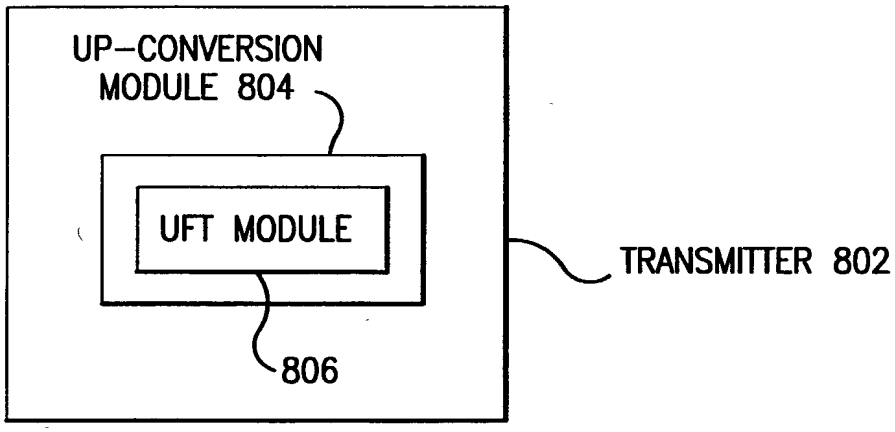
UP-CONVERSION
MODULE 804
UFT MODULE
806
TRANSMITTER 802

FIG. 8

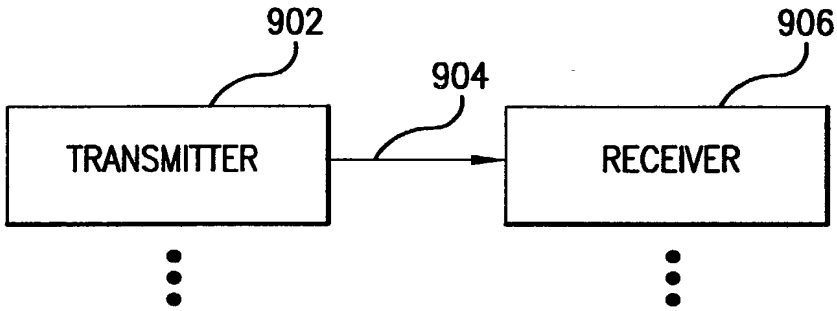
902
904
906
TRANSMITTER
RECEIVER

FIG. 9

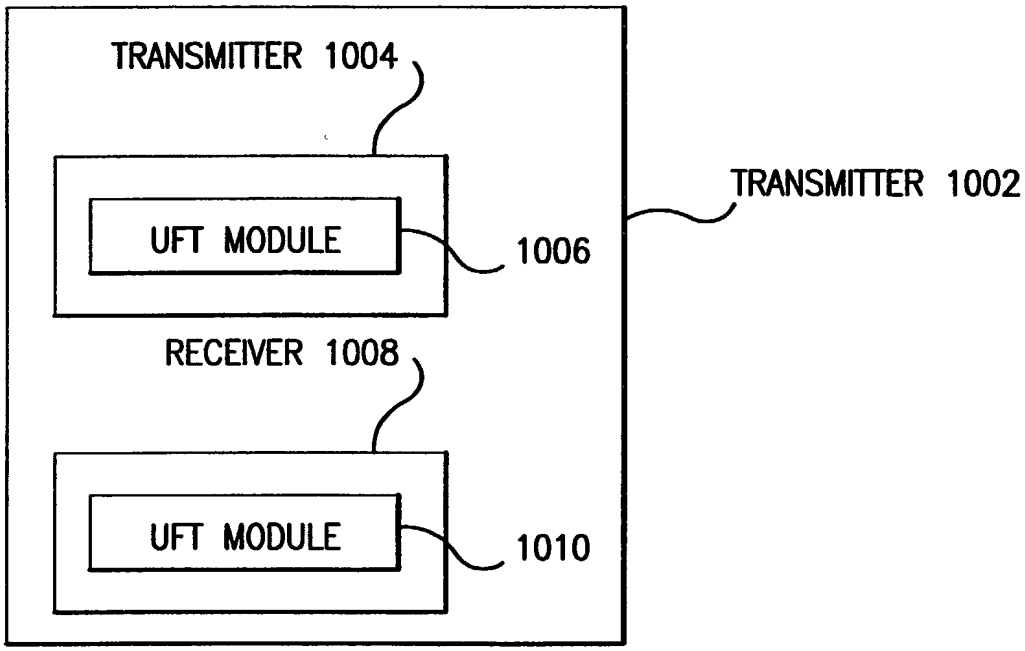
TRANSMITTER 1004
UFT MODULE
1006
TRANSMITTER 1002
RECEIVER 1008
UFT MODULE
1010

FIG. 10

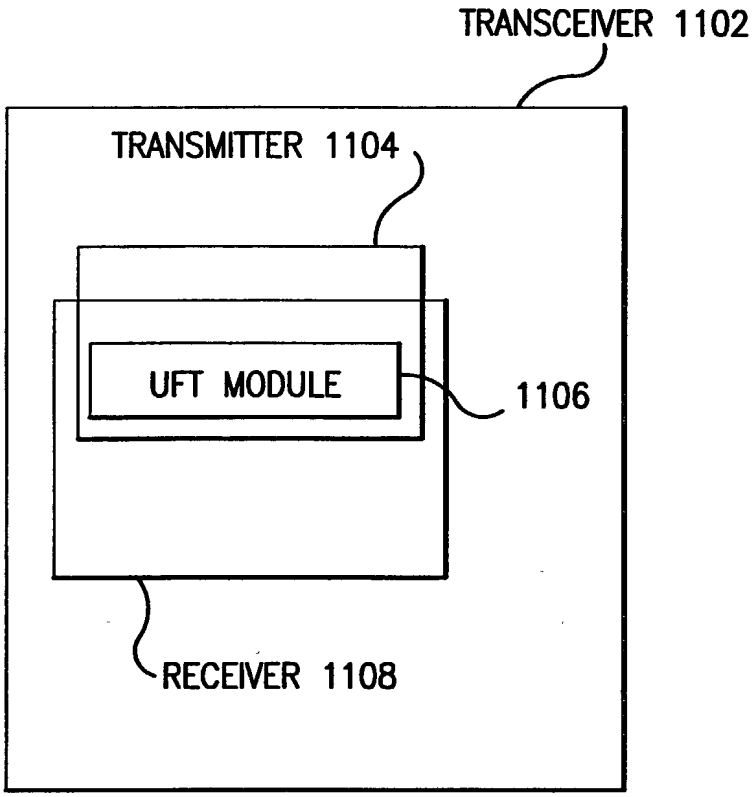
TRANSCEIVER 1102
TRANSMITTER 1104
UFT MODULE
1106
RECEIVER 1108

FIG. 11

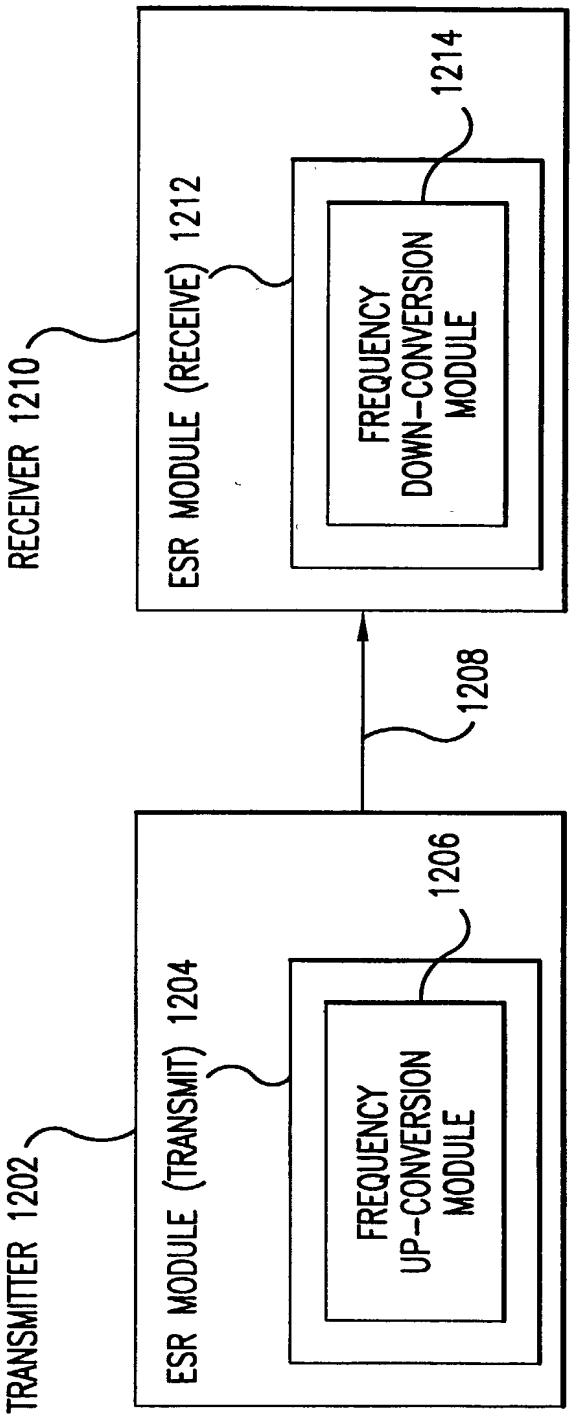
TRANSMITTER 1202
ESR MODULE (TRANSMIT) 1204
FREQUENCY UP-CONVERSION MODULE
1206
1208
RECEIVER 1210
ESR MODULE (RECEIVE) 1212
FREQUENCY DOWN-CONVERSION MODULE
1214

FIG. 12

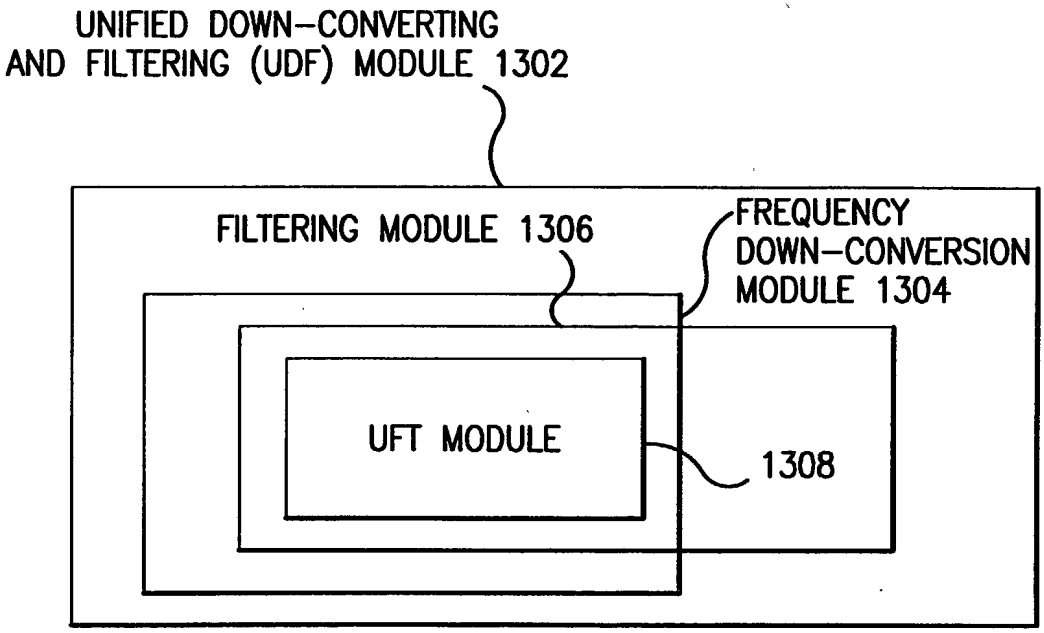
UNIFIED DOWN-CONVERTING
AND FILTERING (UDF) MODULE 1302
FILTERING MODULE 1306
FREQUENCY
DOWN-CONVERSION
MODULE 1304
UFT MODULE
1308

FIG. 13

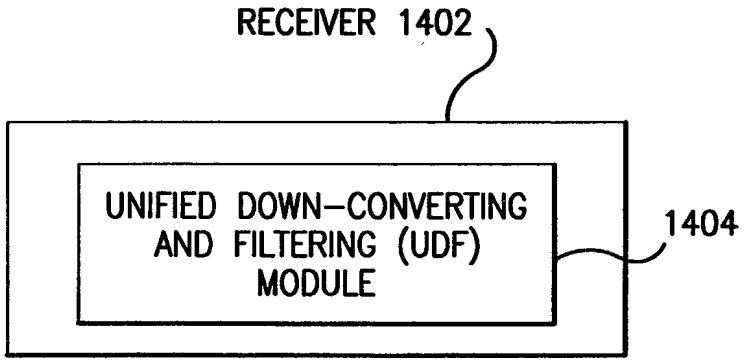
RECEIVER 1402
UNIFIED DOWN-CONVERTING
AND FILTERING (UDF)
MODULE
1404

FIG. 14

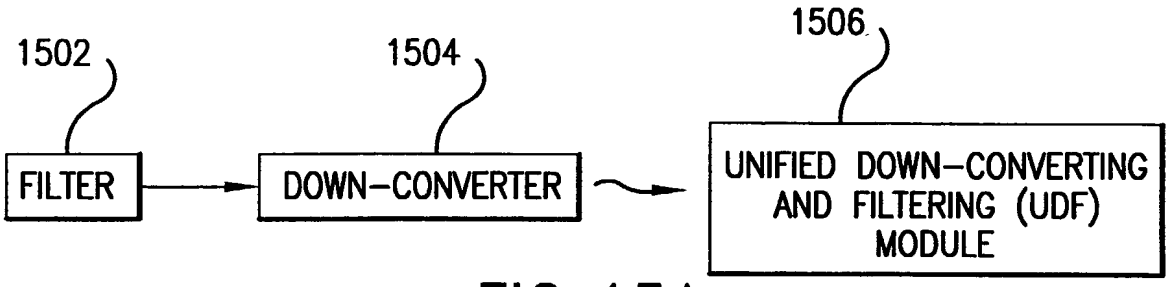

FIG. 15A

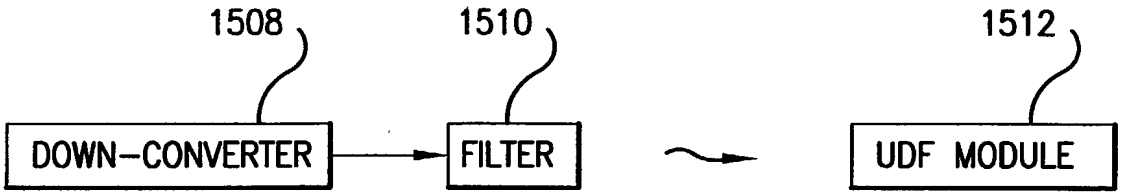

FIG. 15B

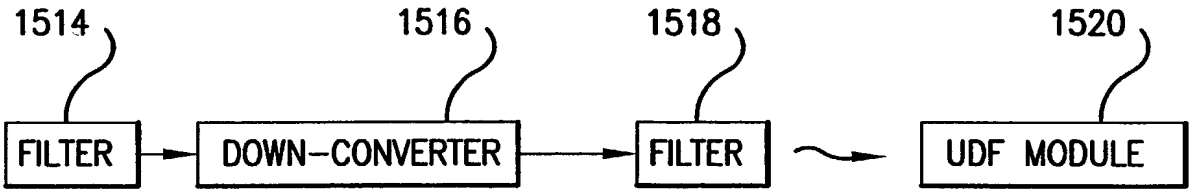

FIG. 15C

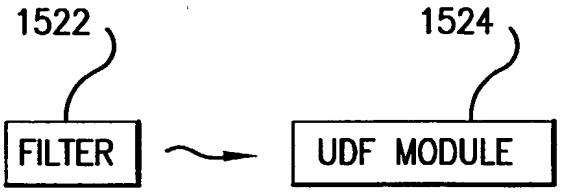

FIG. 15D

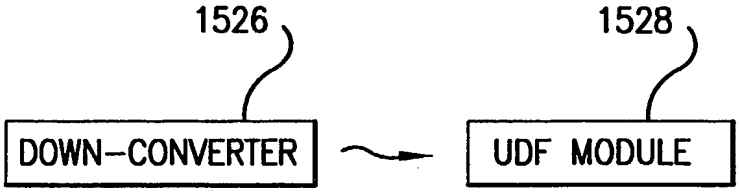

FIG. 15E

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Inventors Sorrells *et al* , Tel 202/371-2600
Title Applications of Universal Frequency Translation

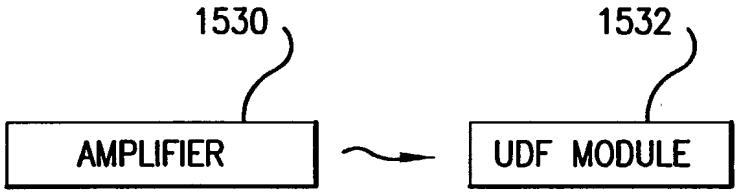

FIG. 15F

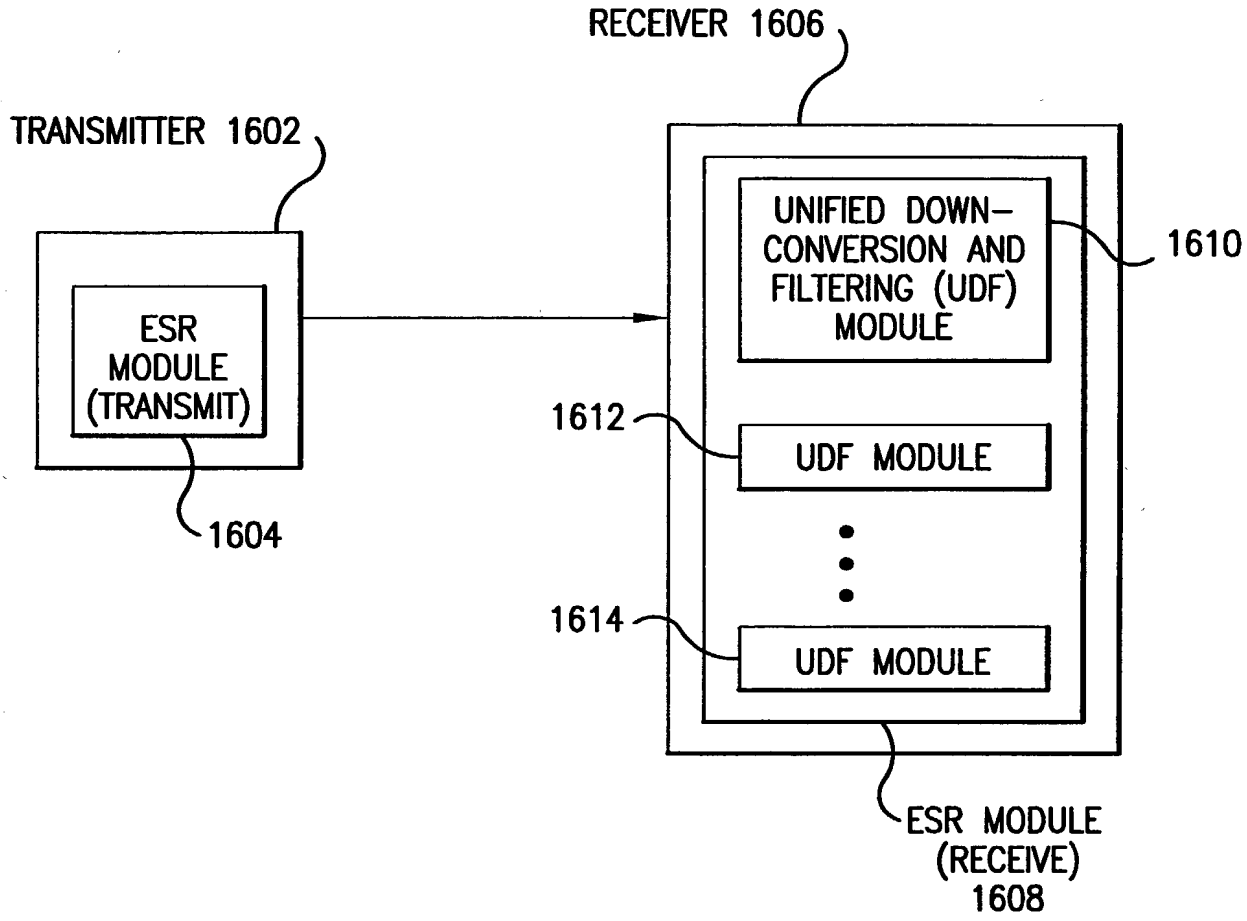
RECEIVER 1606
TRANSMITTER 1602
UNIFIED DOWN-CONVERSION AND FILTERING (UDF) MODULE
1610
ESR MODULE (TRANSMIT)
1612
UDF MODULE
1604
1614
UDF MODULE
ESR MODULE (RECEIVE) 1608

FIG. 16

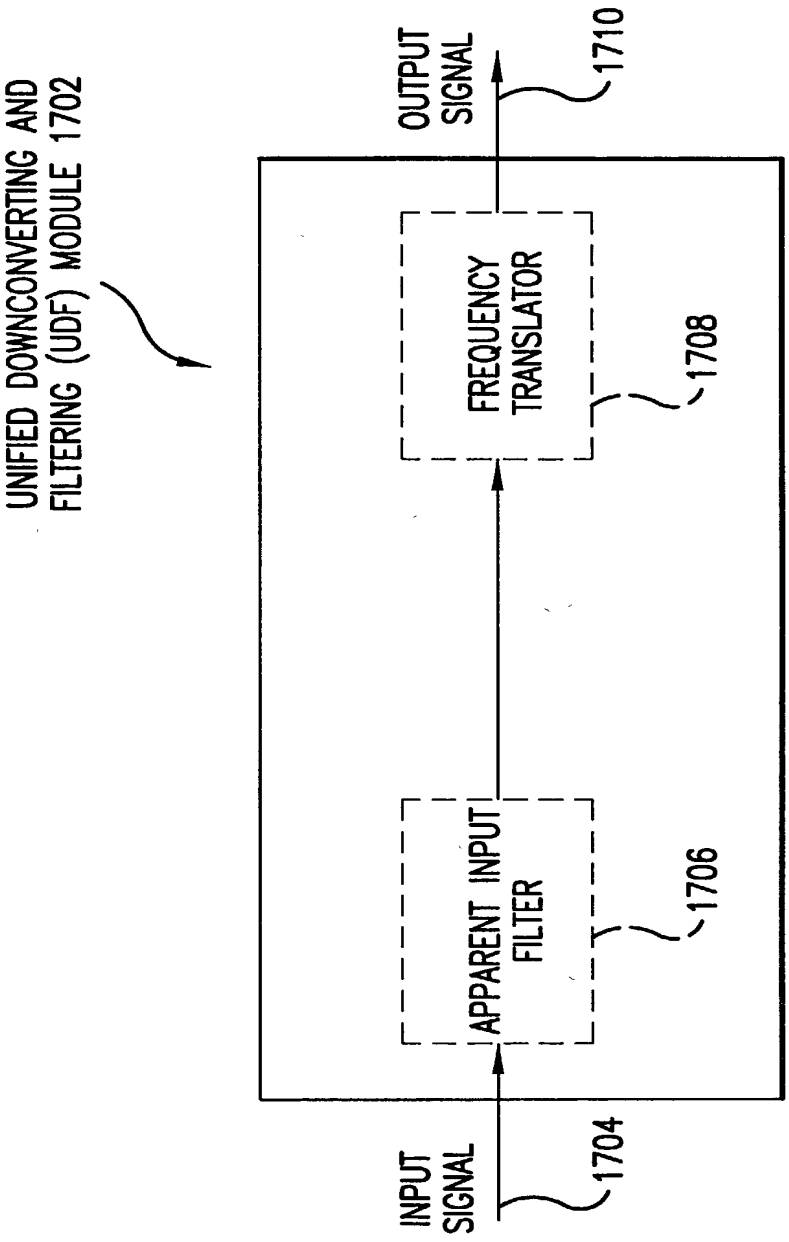
UNIFIED DOWNCONVERTING AND FILTERING (UDF) MODULE 1702
OUTPUT SIGNAL
1710
FREQUENCY TRANSLATOR
1708
APPARENT INPUT FILTER
1706
INPUT SIGNAL
1704

FIG. 17

1802

TIME / NODE	t−1 (RISING EDGE OF ϕ_1)	t−1 (RISING EDGE OF ϕ_2)	t (RISING EDGE OF ϕ_1)	t (RISING EDGE OF ϕ_2)	t+1 (RISING EDGE OF ϕ_1)
1902	VI_{t-1} 1804	VI_{t-1} 1808	VI_t 1816	VI_t 1826	VI_{t+1} 1838
1904	—	VI_{t-1} 1810	VI_{t-1} 1818	VI_t 1828	VI_t 1840
1906	VO_{t-1} 1806	VO_{t-1} 1812	VO_t 1820	VO_t 1830	VO_{t+1} 1842
1908	—	VO_{t-1} 1814	VO_{t-1} 1822	VO_t 1832	VO_t 1844
1910	— 1807	—	VO_{t-1} 1824	VO_{t-1} 1834	VO_t 1846
1912	—	— 1815	—	VO_{t-1} 1836	VO_{t-1} 1848
1918	—	—	—	—	VI_t − 0.1*VO_t − 0.8*VO_{t-1} 1850

FIG. 18

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Dkt No 1744 0140006, Group Art Unit 2681
Inventors Sorrells *et al* , Tel 202/371-2600
Title Applications of Universal Frequency Translation

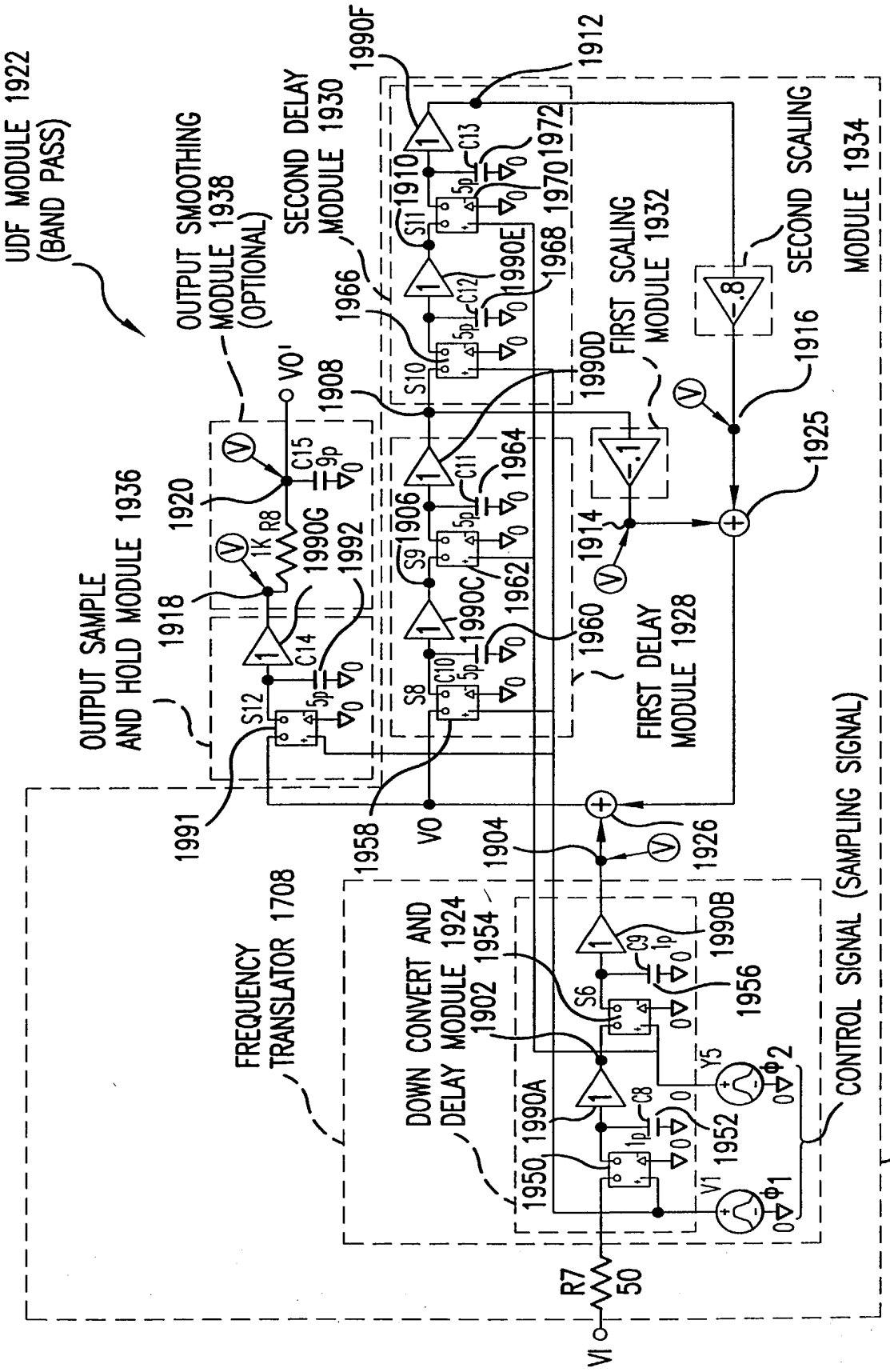

FIG. 19

Appl No 10/086,250, Filed March 4, 2002
Dkt No 1744 0140006, Group Art Unit 2681
Inventors Sorrells *et al.*, Tel 202/371-2600
Title Applications of Universal Frequency Translation

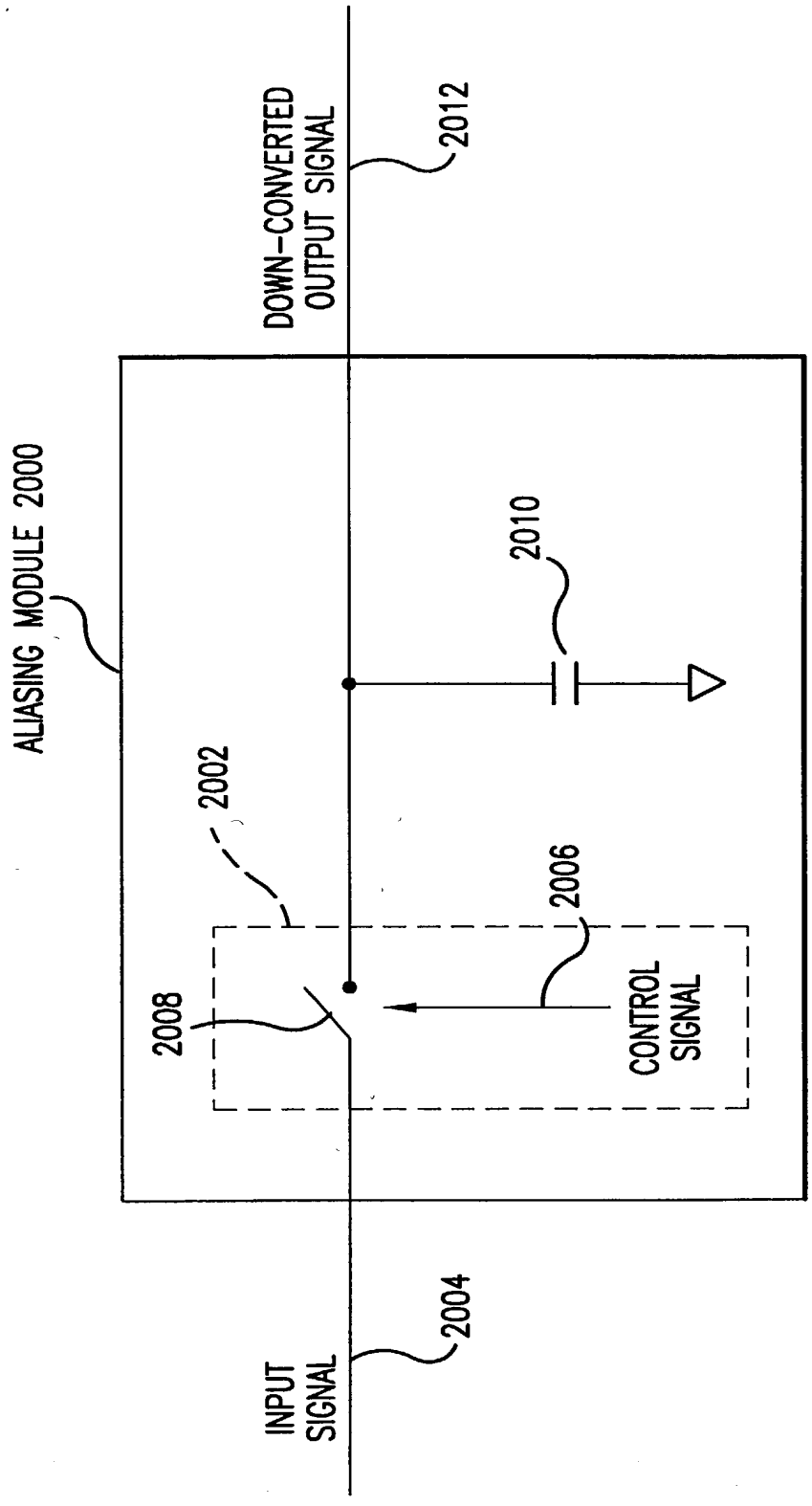

FIG. 20A

Appl No 10/086,250, Filed March 4, 2002
Dkt No 1744 0140006, Group Art Unit 2681
Inventors Sorrells *et al* , Tel 202/371-2600
Title Applications of Universal Frequency Translation

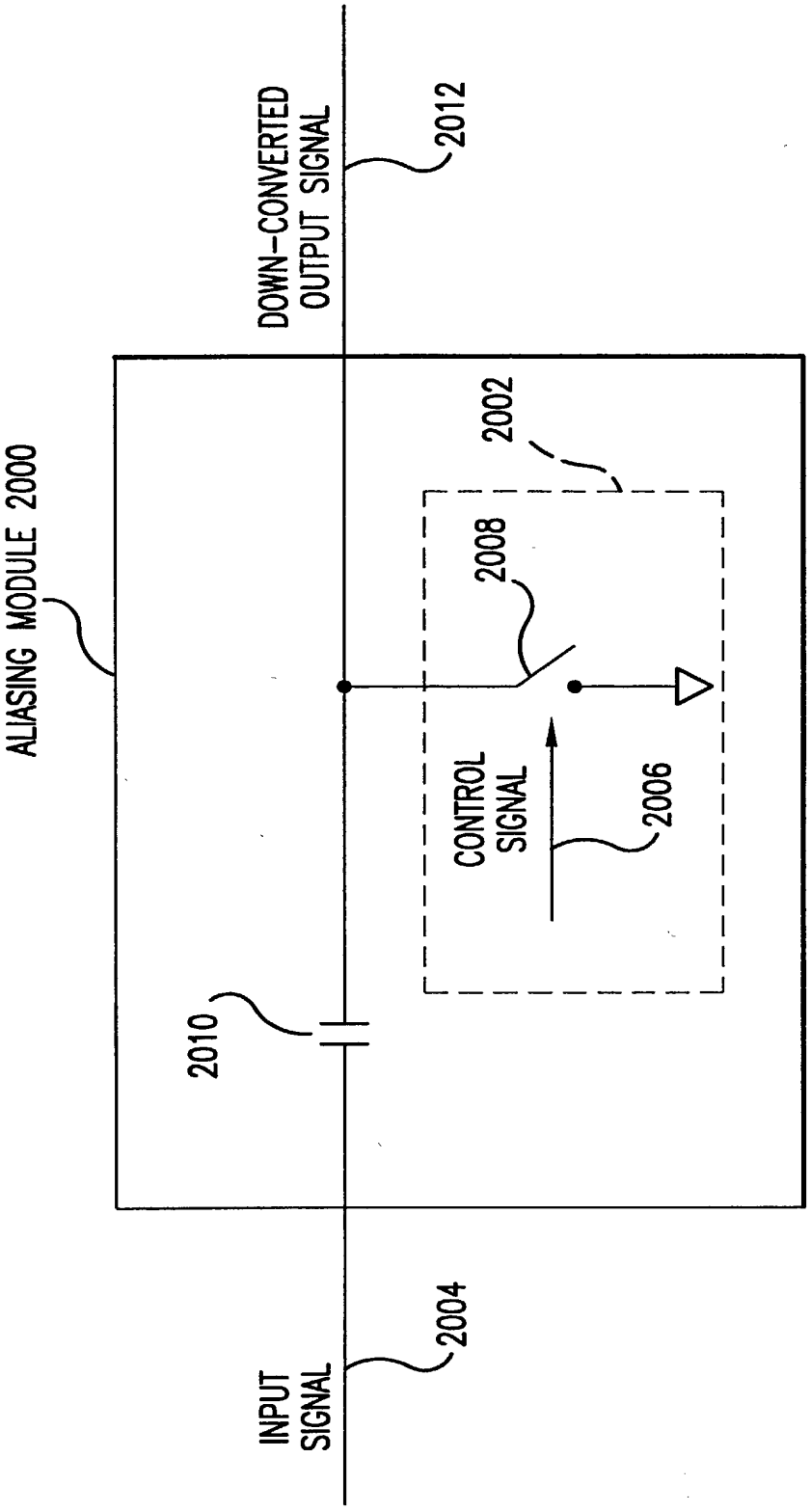

FIG. 20A-1

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Inventors Sorrells *et al*, Tel 202/371-2600
Title Applications of Universal Frequency Translation

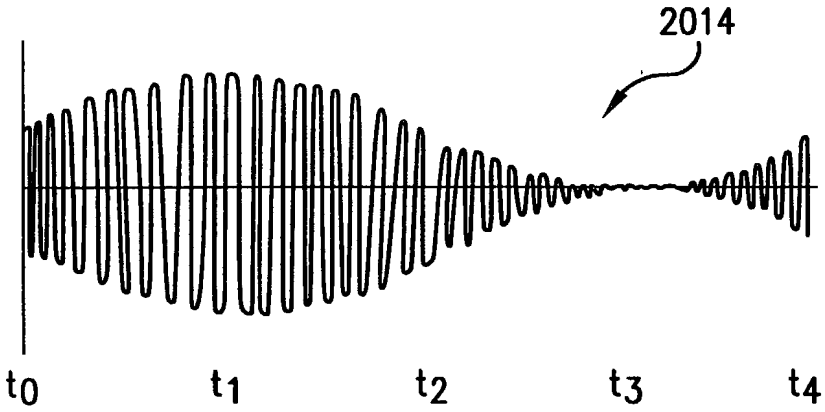

FIG. 20B

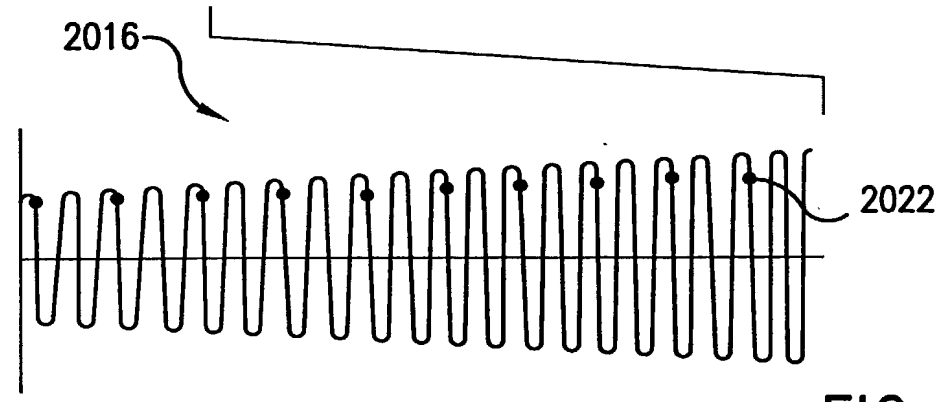

FIG. 20C

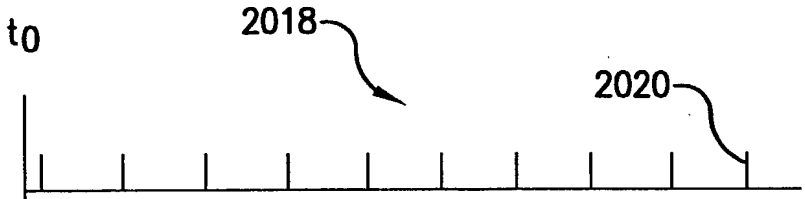

FIG. 20D

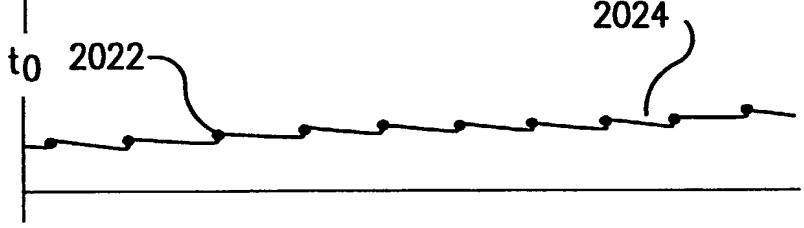

FIG. 20E

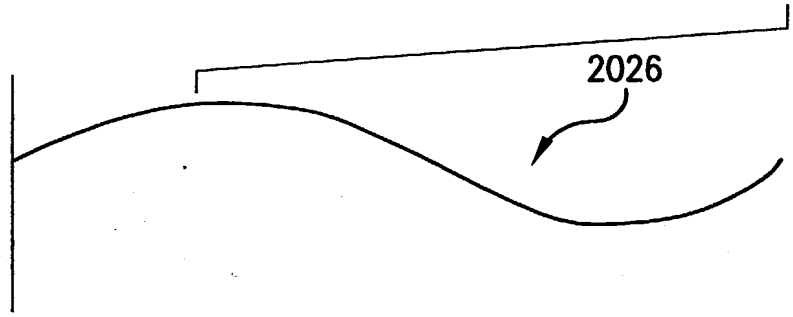

FIG. 20F

Appl No 10/086,250, Filed March 4, 2002
Dkt No 1744 0140006, Group Art Unit 2681
Inventors Sorrells *et al* , Tel 202/371-2600
Title Applications of Universal Frequency Translation

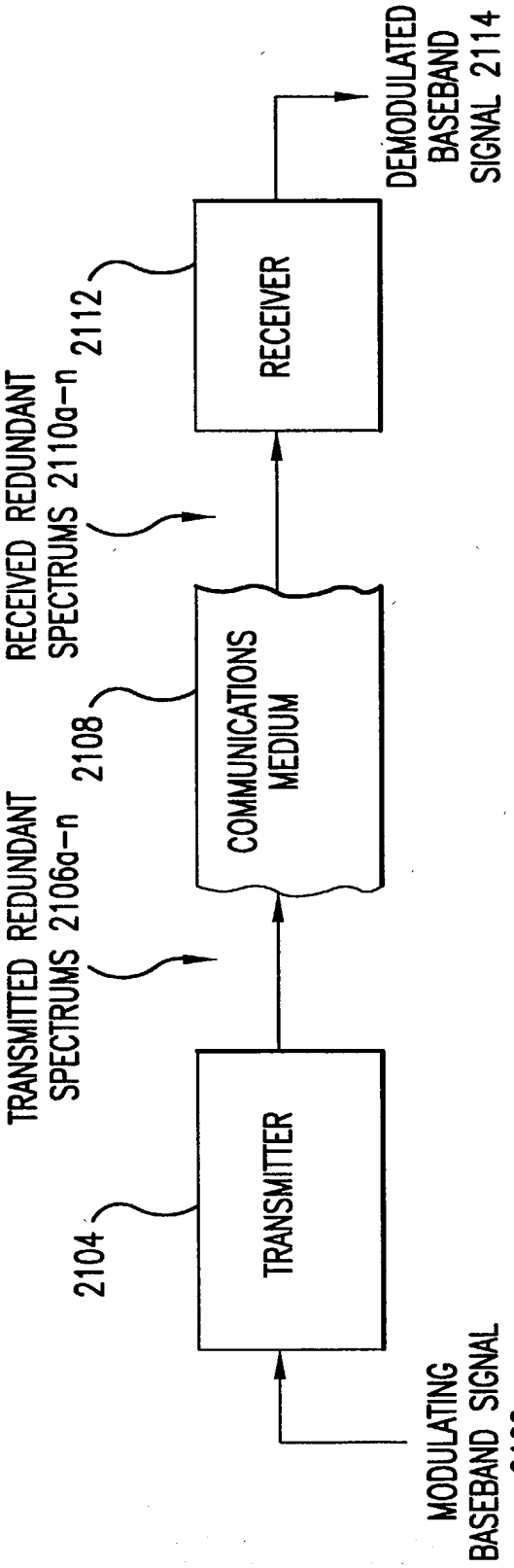

FIG. 21

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Dkt No 1744 0140006, Group Art Unit 2681
Inventors Sorrells *et al.*, Tel 202/371-2600
Title Applications of Universal Frequency Translation

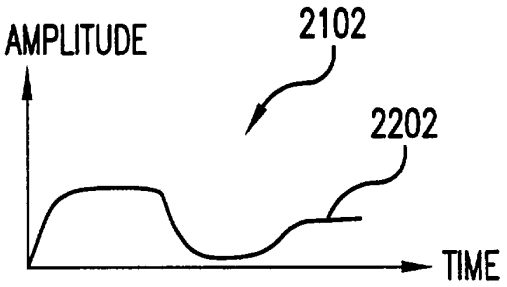

FIG. 22A

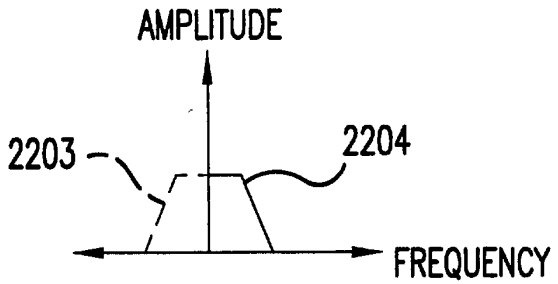

FIG. 22B

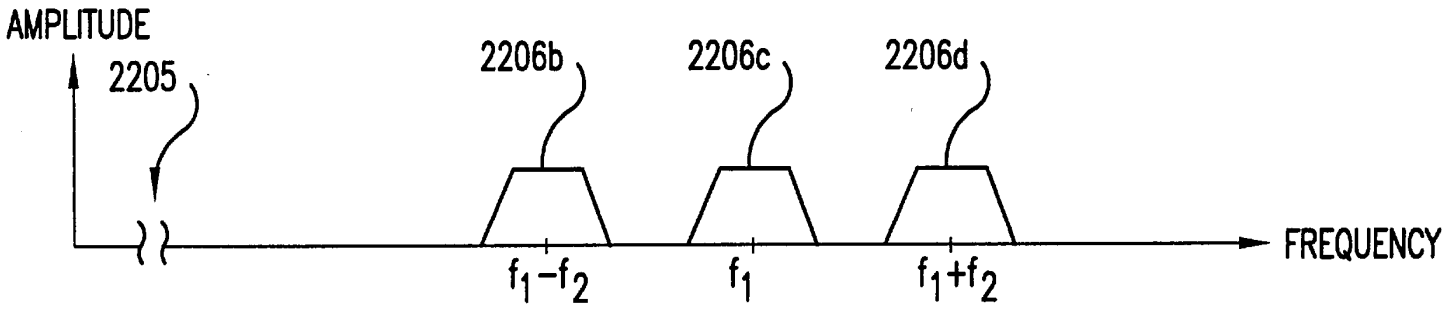

FIG. 22C

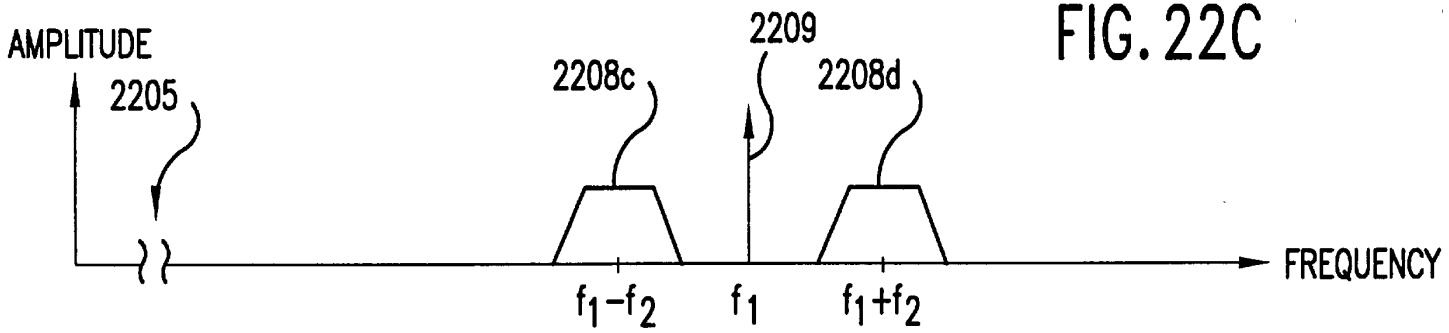

FIG. 22D

Appl No 10/086,250, Filed March 4, 2002
Dkt No 1744 0140006, Group Art Unit 2681
Inventors Sorrells *et al*, Tel 202/371-2600
Title Applications of Universal Frequency Translation

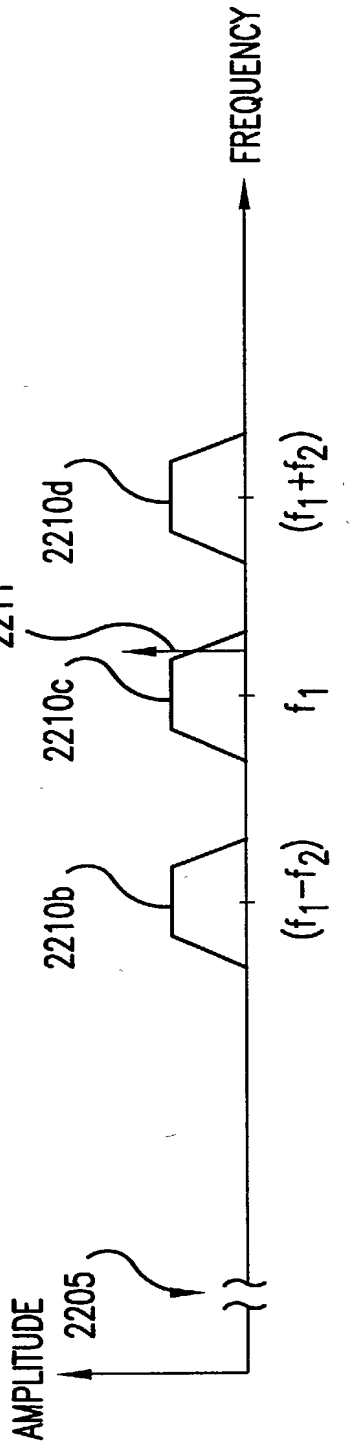

FIG. 22E

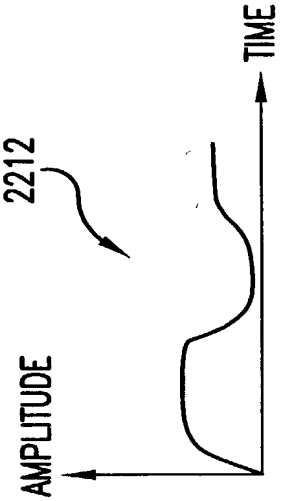

FIG. 22F

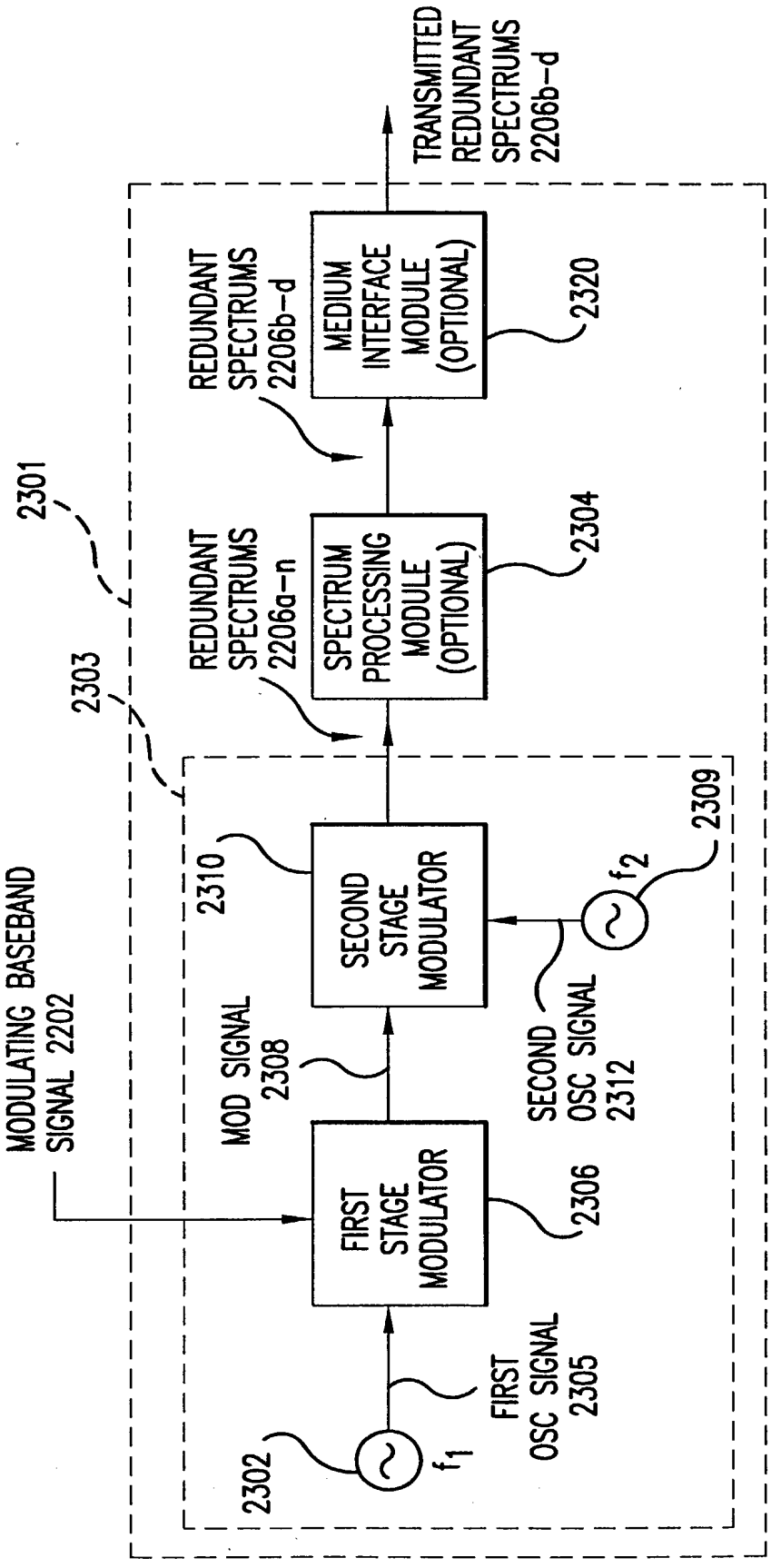
TRANSMITTED REDUNDANT SPECTRUMS 2206b-d
REDUNDANT SPECTRUMS 2206b-d
MEDIUM INTERFACE MODULE (OPTIONAL)
2320
2301
REDUNDANT SPECTRUMS 2206a-n
SPECTRUM PROCESSING MODULE (OPTIONAL)
2304
2303
2310
SECOND STAGE MODULATOR
2309
f_2
MODULATING BASEBAND SIGNAL 2202
MOD SIGNAL 2308
SECOND OSC SIGNAL 2312
FIRST STAGE MODULATOR
2306
FIRST OSC SIGNAL 2305
2302
f_1

FIG. 23A

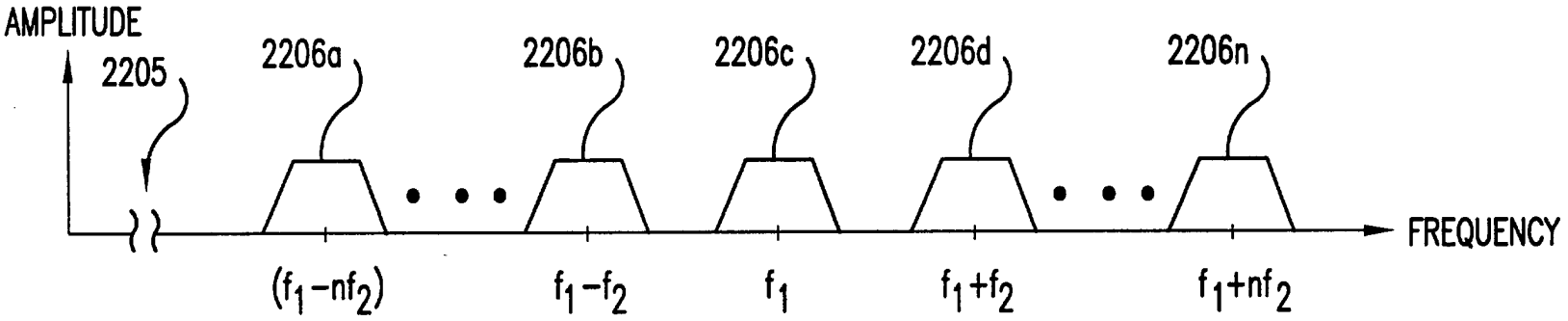

FIG. 23B

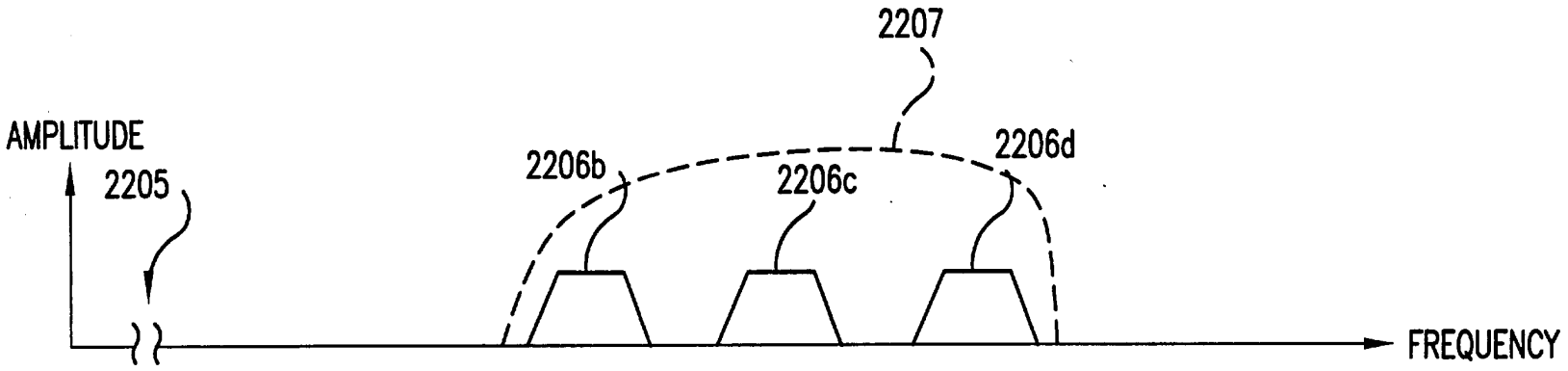

FIG. 23C

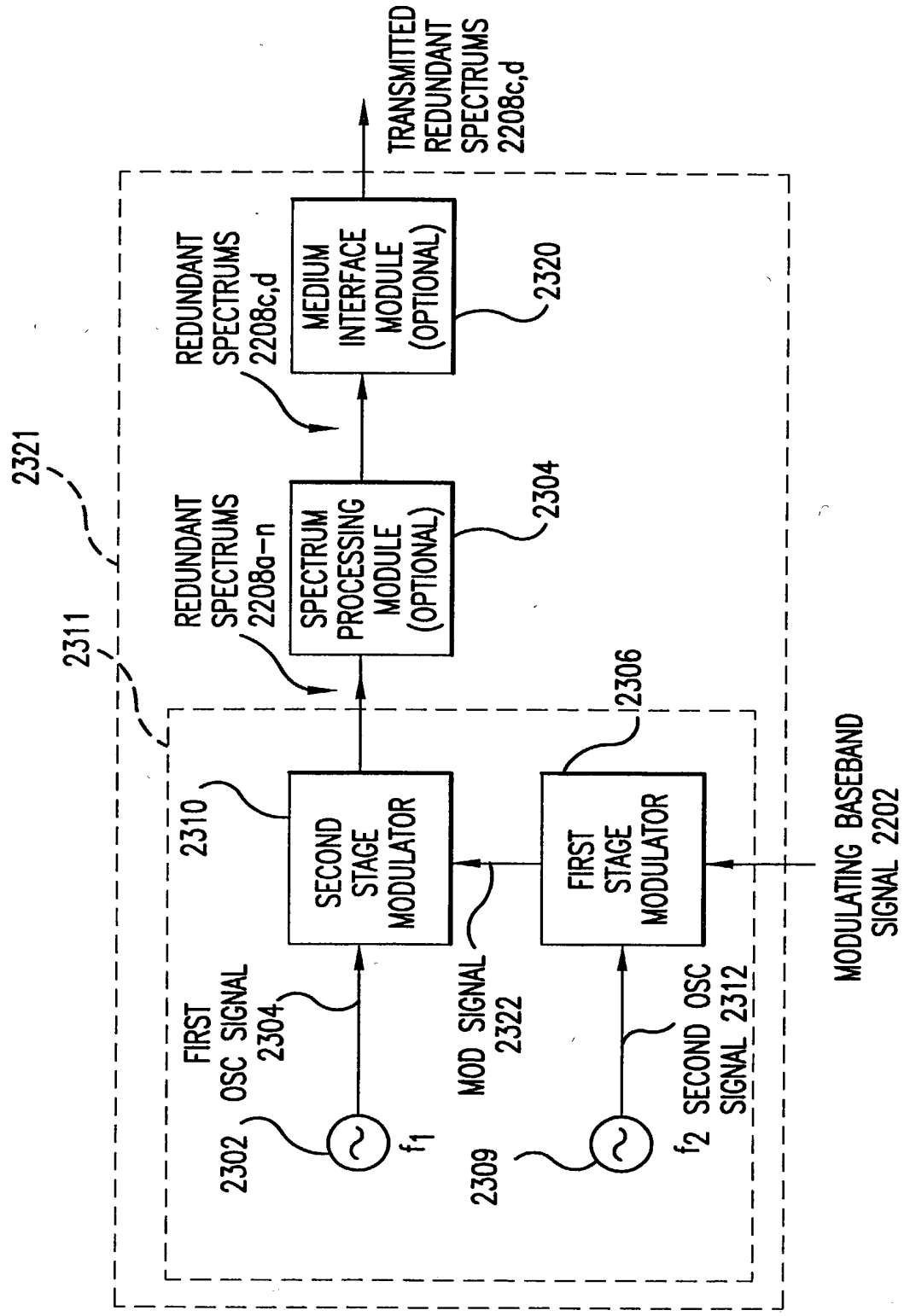
TRANSMITTED REDUNDANT SPECTRUMS 2208c,d
REDUNDANT SPECTRUMS 2208c,d
MEDIUM INTERFACE MODULE (OPTIONAL)
2320
2321
REDUNDANT SPECTRUMS 2208a–n
SPECTRUM PROCESSING MODULE (OPTIONAL)
2304
2311
2306
2310
SECOND STAGE MODULATOR
FIRST STAGE MODULATOR
MODULATING BASEBAND SIGNAL 2202
FIRST OSC SIGNAL 2304
MOD SIGNAL 2322
2302
f_1
2309
f_2
SECOND OSC SIGNAL 2312

FIG. 23D

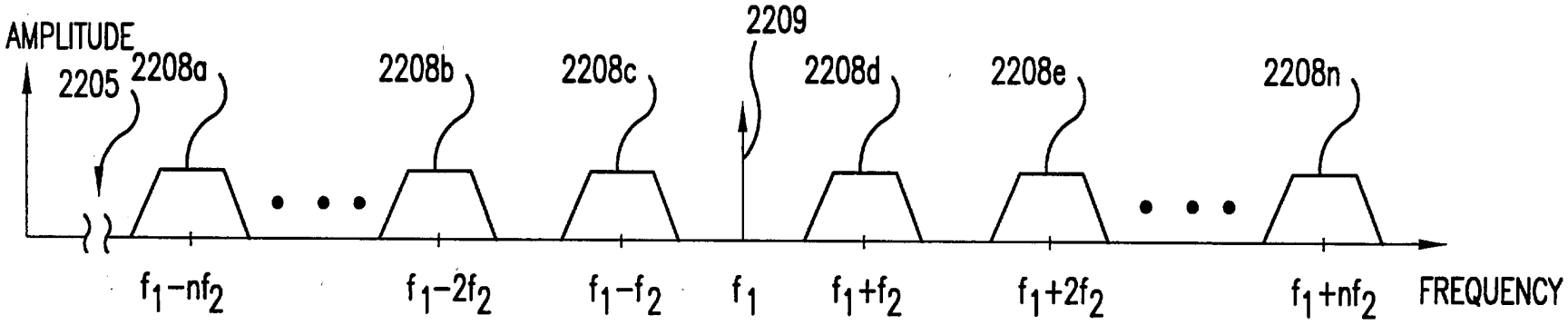

FIG. 23E

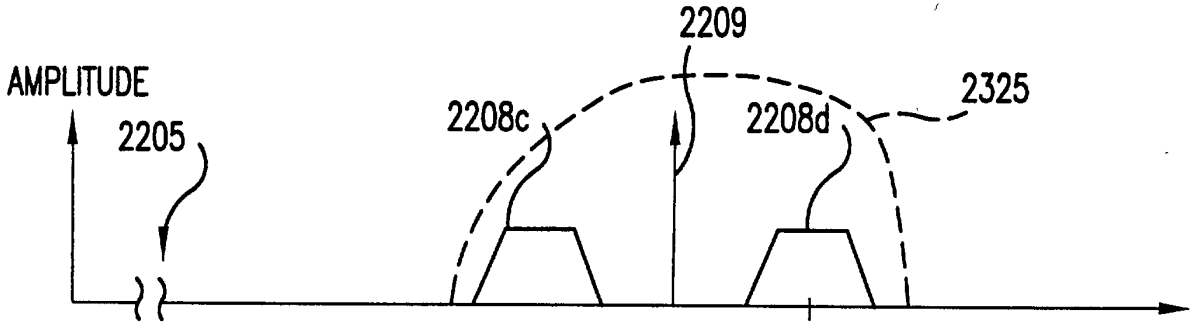

FIG. 23F

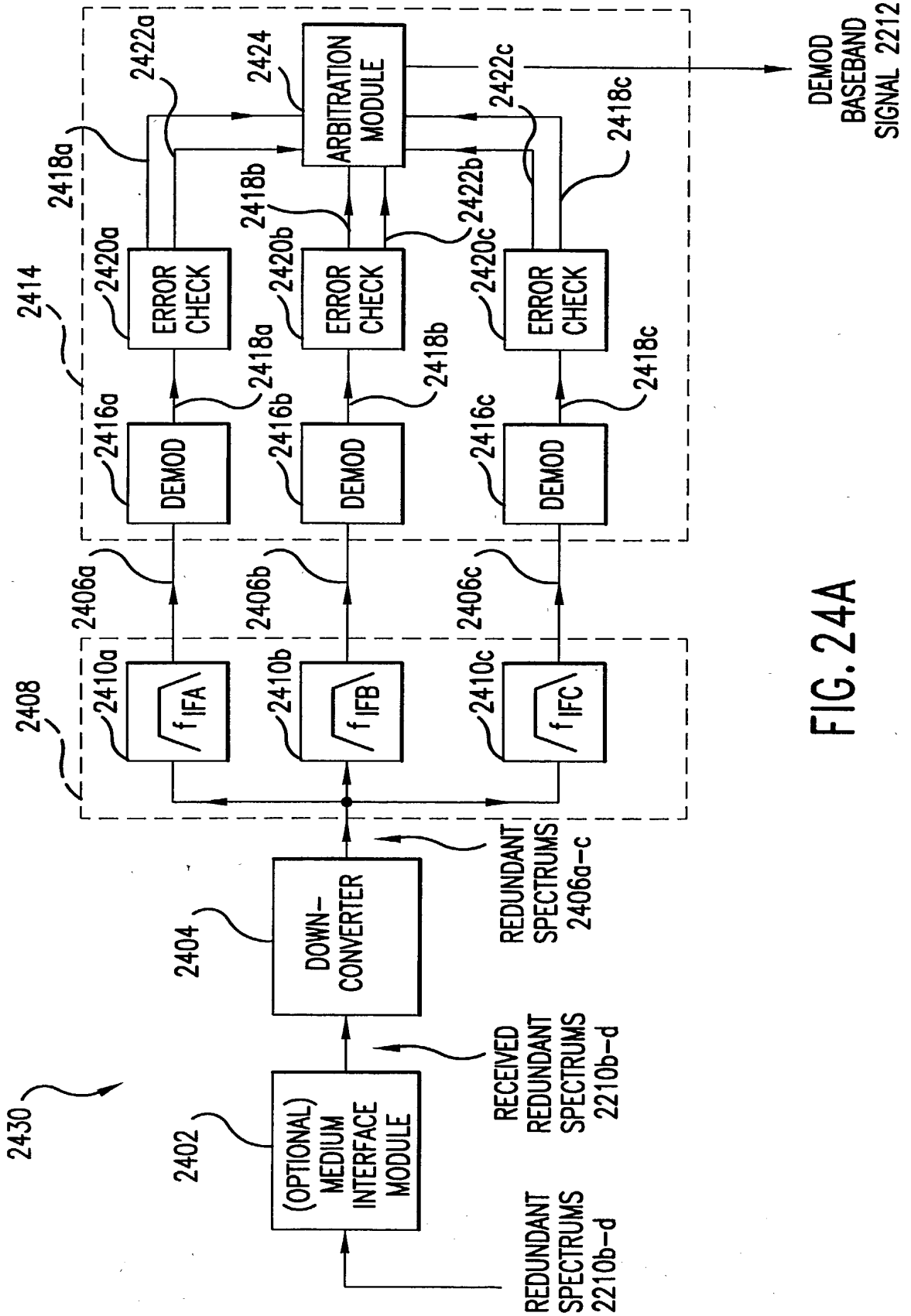
2430
2402
(OPTIONAL) MEDIUM INTERFACE MODULE
REDUNDANT SPECTRUMS 2210b-d
RECEIVED REDUNDANT SPECTRUMS 2210b-d
2404
DOWN-CONVERTER
REDUNDANT SPECTRUMS 2406a-c
2408
2410a
f_{IFA}
2410b
f_{IFB}
2410c
f_{IFC}
2406a
2406b
2406c
2414
2416a
DEMOD
2416b
DEMOD
2416c
DEMOD
2418a
2418b
2418c
2420a
ERROR CHECK
2420b
ERROR CHECK
2420c
ERROR CHECK
2422a
2422b
2422c
2424
ARBITRATION MODULE
DEMOD BASEBAND SIGNAL 2212

FIG. 24A

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Inventors Sorrells *et al*, Tel 202/371-2600
Title Applications of Universal Frequency Translation

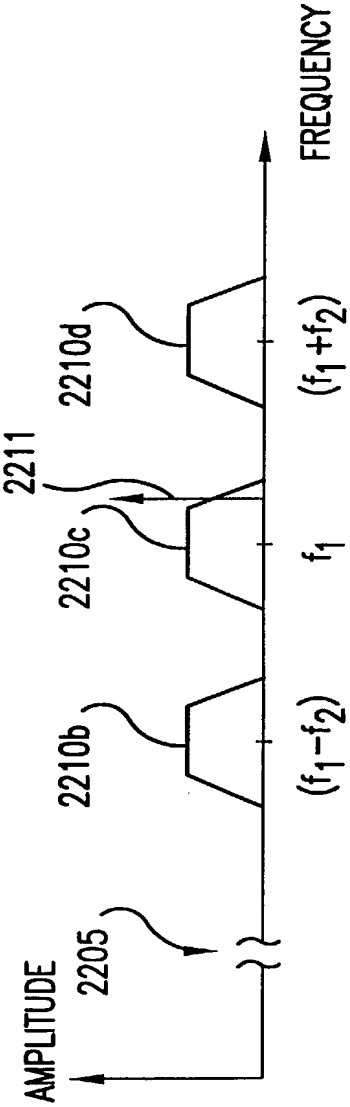

FIG. 24B

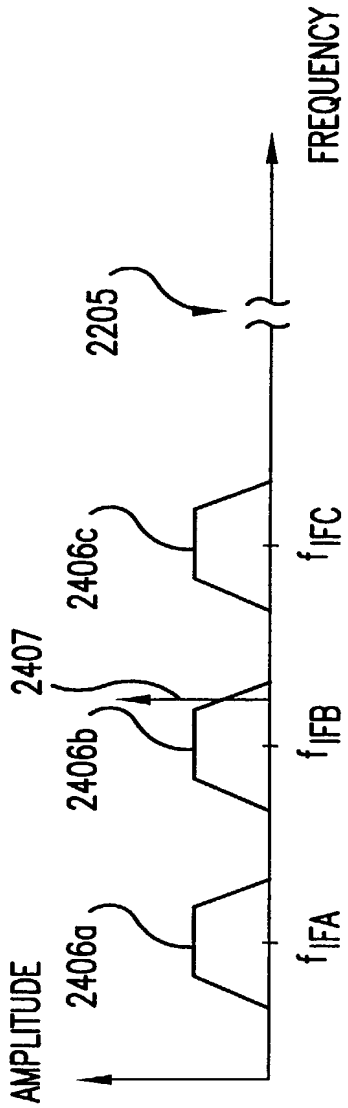

FIG. 24C

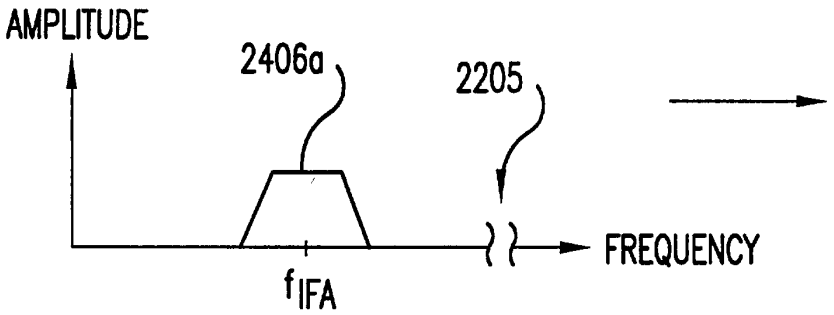

FIG. 24D

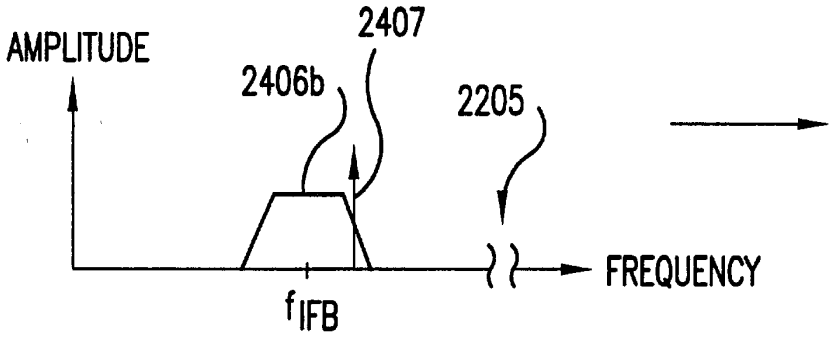

FIG. 24E

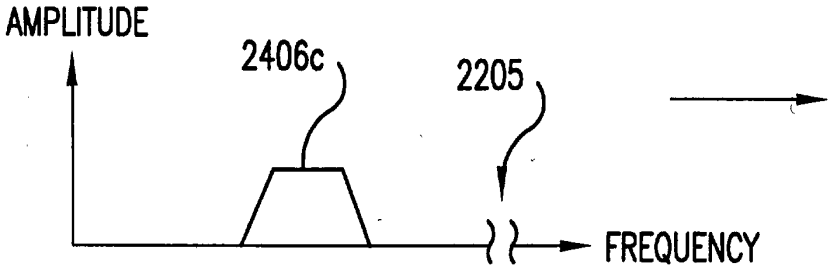

FIG. 24F

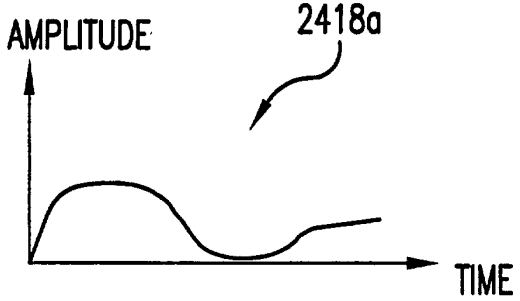

FIG. 24G

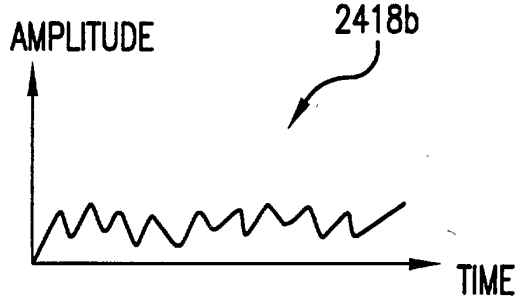

FIG. 24H

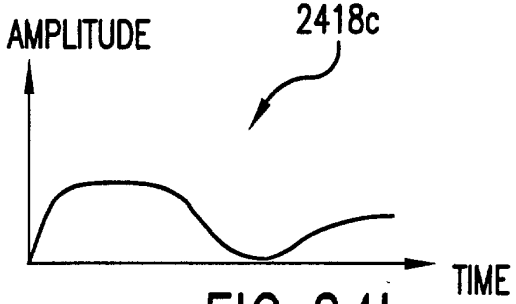

FIG. 24I

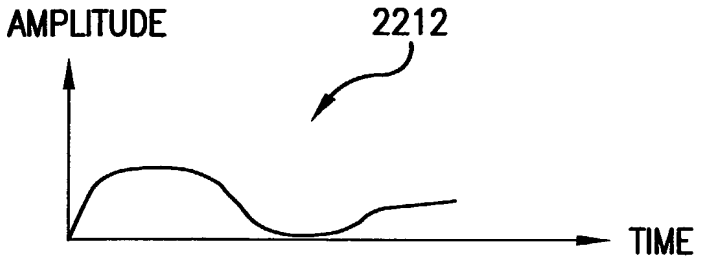

FIG. 24J

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Dkt No 1744 0140006, Group Art Unit 2681
Inventors Sorrells *et al* , Tel 202/371-2600
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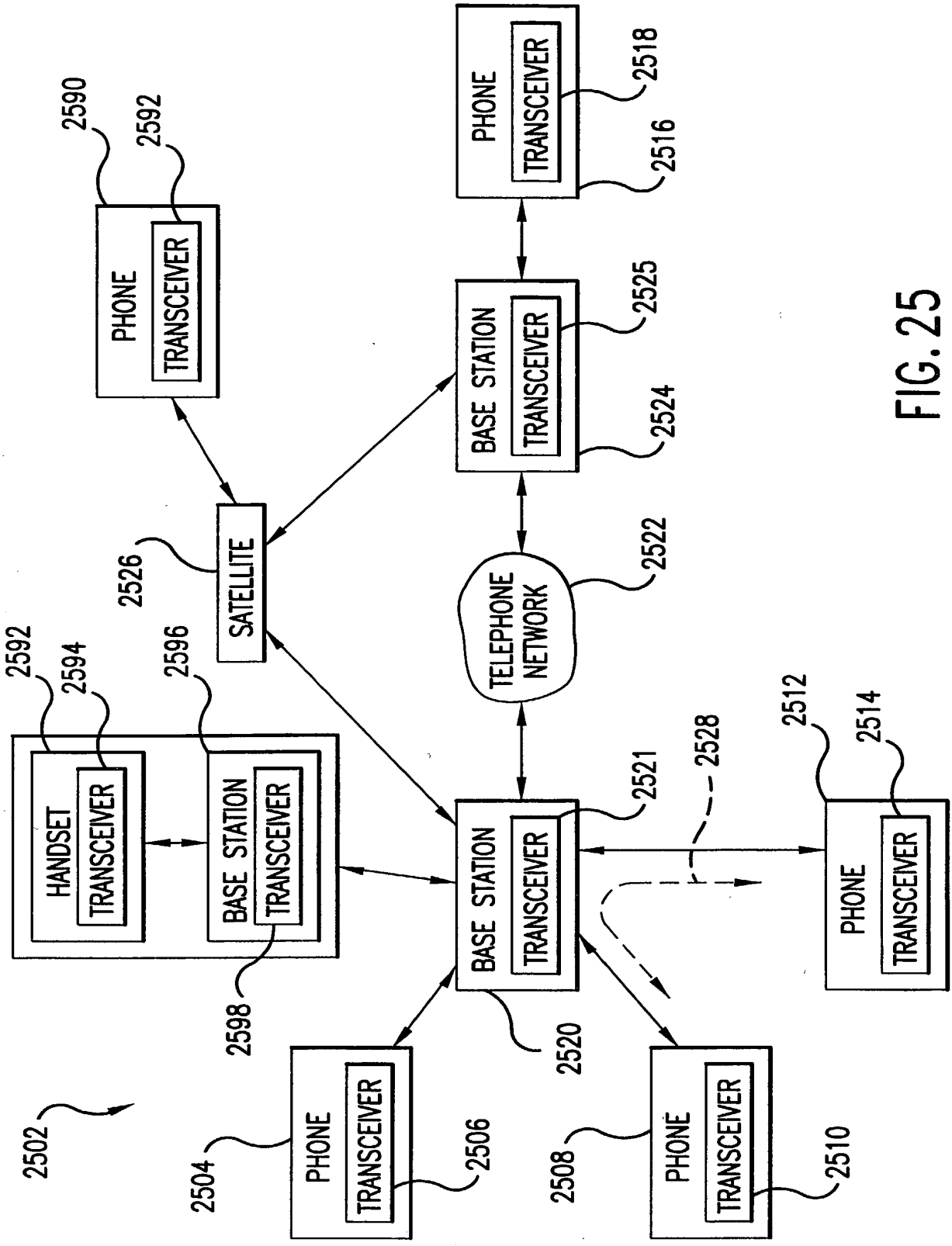

FIG. 25

Appl No 10/086,250, Filed March 4, 2002
Dkt No 1744 0140006, Group Art Unit 2681
Inventors Sorrells *et al*, Tel 202/371-2600
Title Applications of Universal Frequency Translation

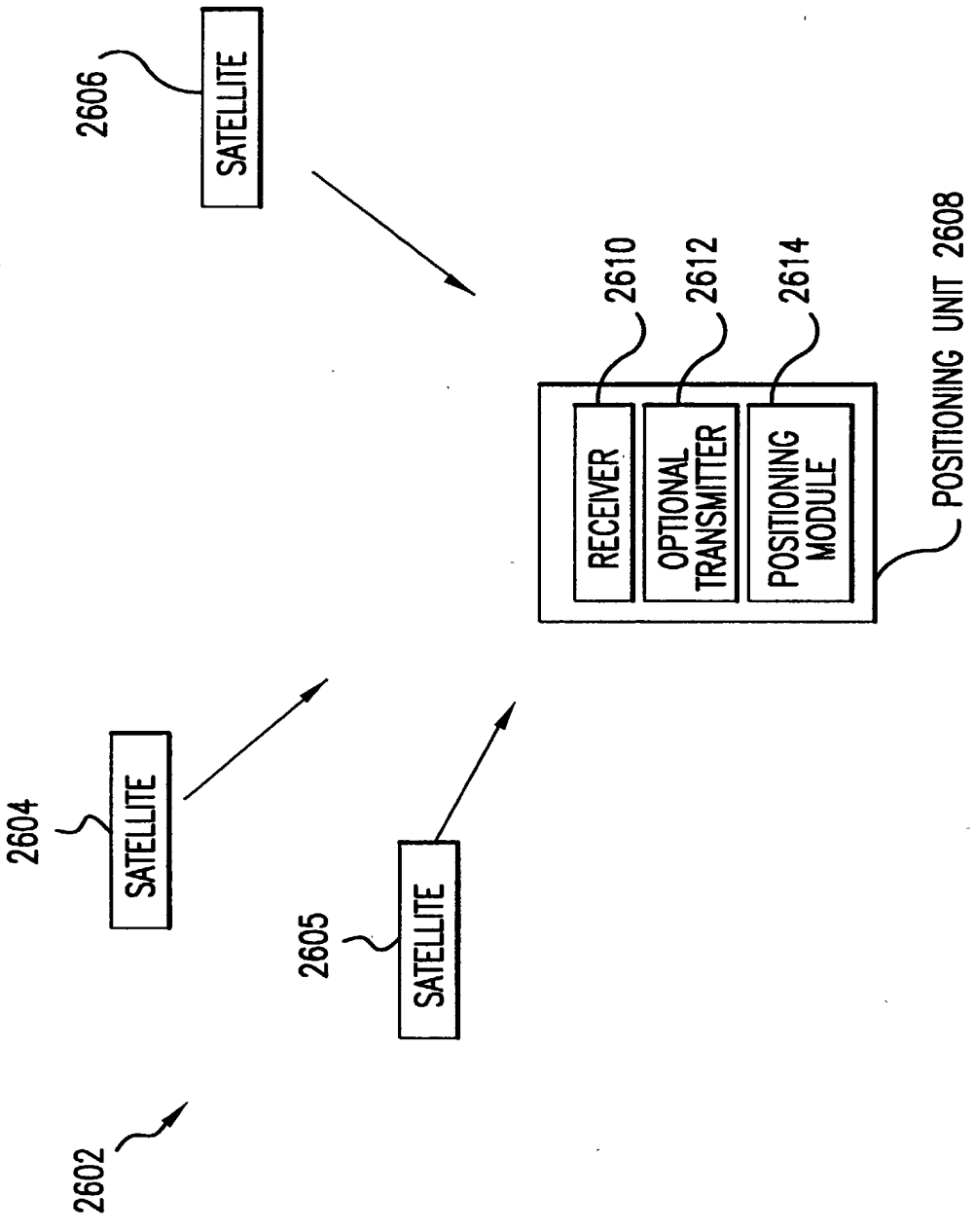

FIG. 26

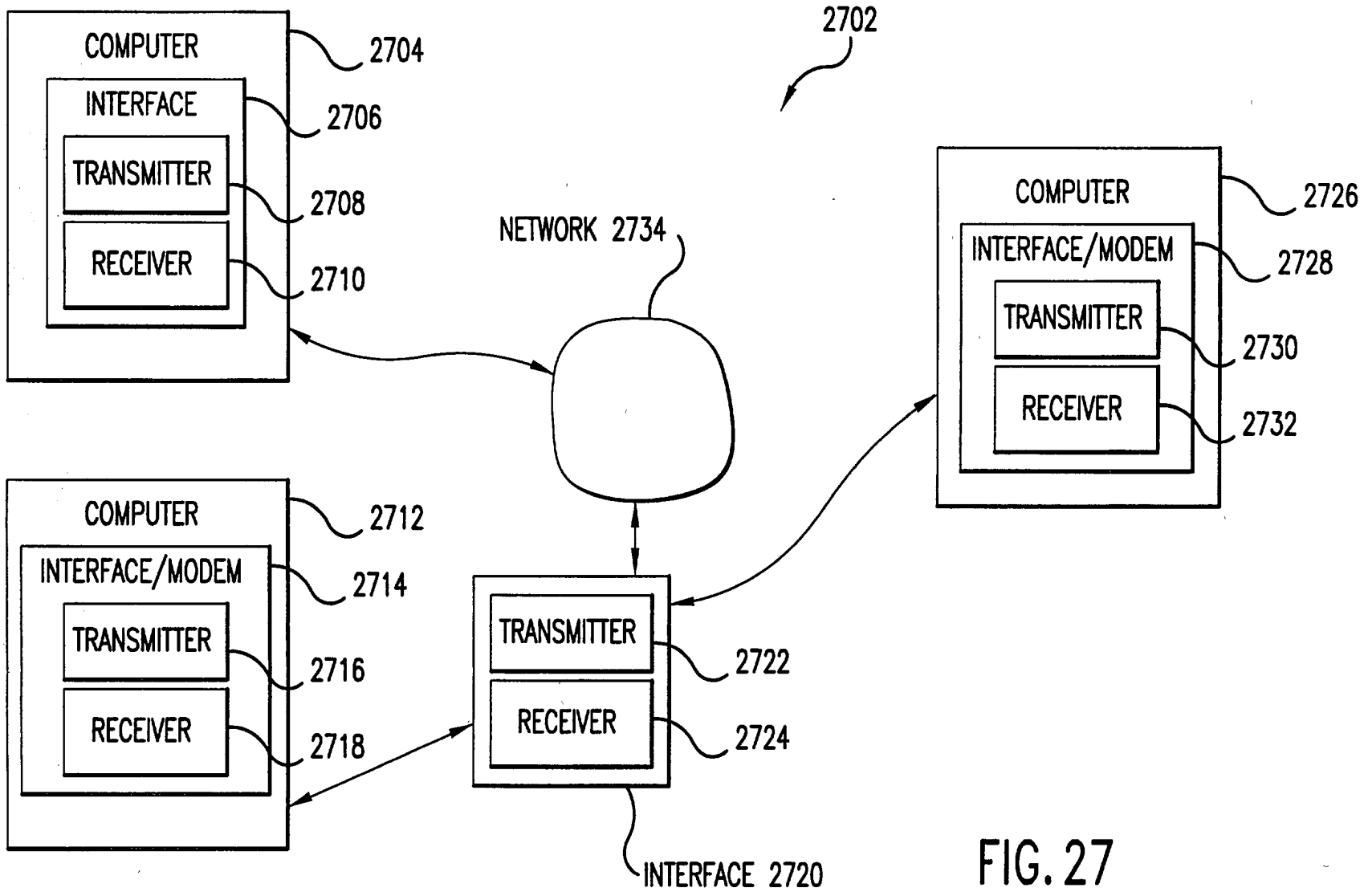

FIG. 27

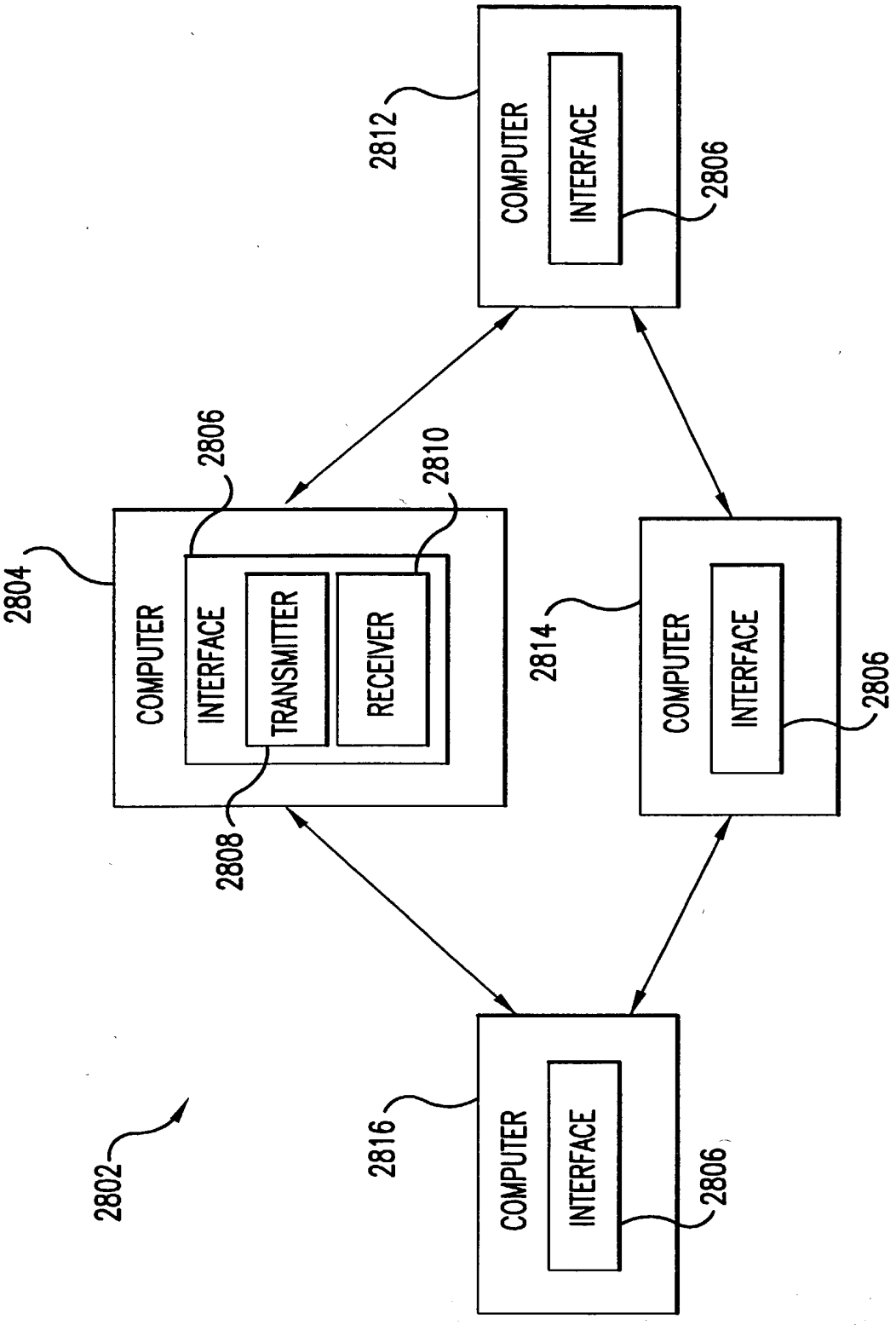
2802
2804
COMPUTER
INTERFACE
TRANSMITTER
RECEIVER
2806
2808
2810
2812
COMPUTER
INTERFACE
2806
2814
COMPUTER
INTERFACE
2806
2816
COMPUTER
INTERFACE
2806

FIG. 28

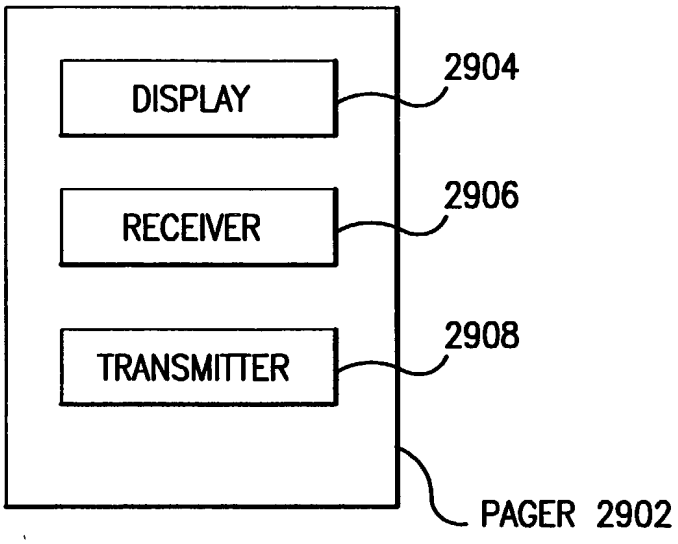

FIG. 29

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Dkt No 1744 0140006, Group Art Unit 2681
Inventors Sorrells *et al* , Tel 202/371-2600
Title Applications of Universal Frequency Translation

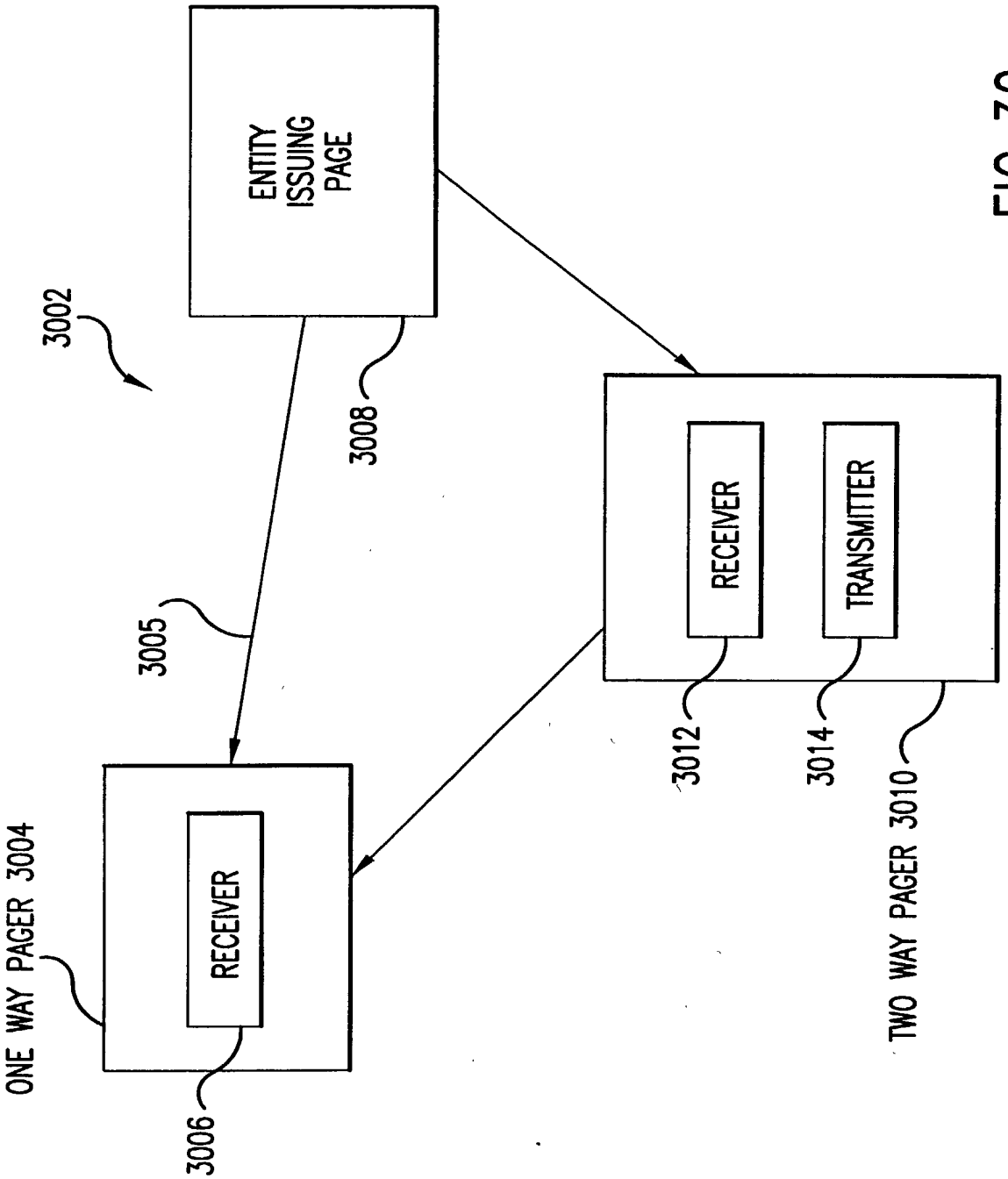

FIG. 30

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Dkt No 1744 0140006, Group Art Unit 2681
Inventors Sorrells *et al*, Tel 202/371-2600
Title Applications of Universal Frequency Translation

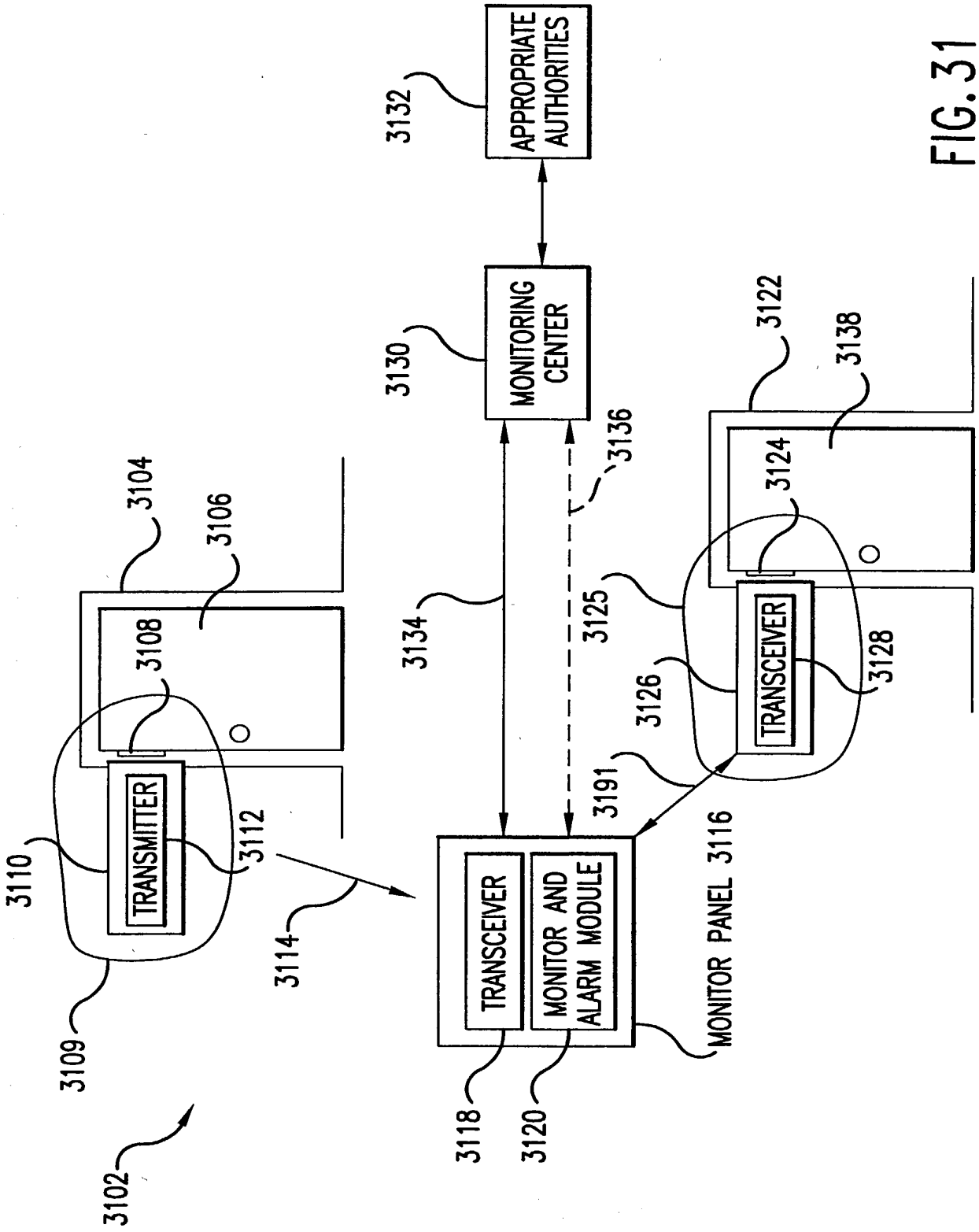

FIG. 31

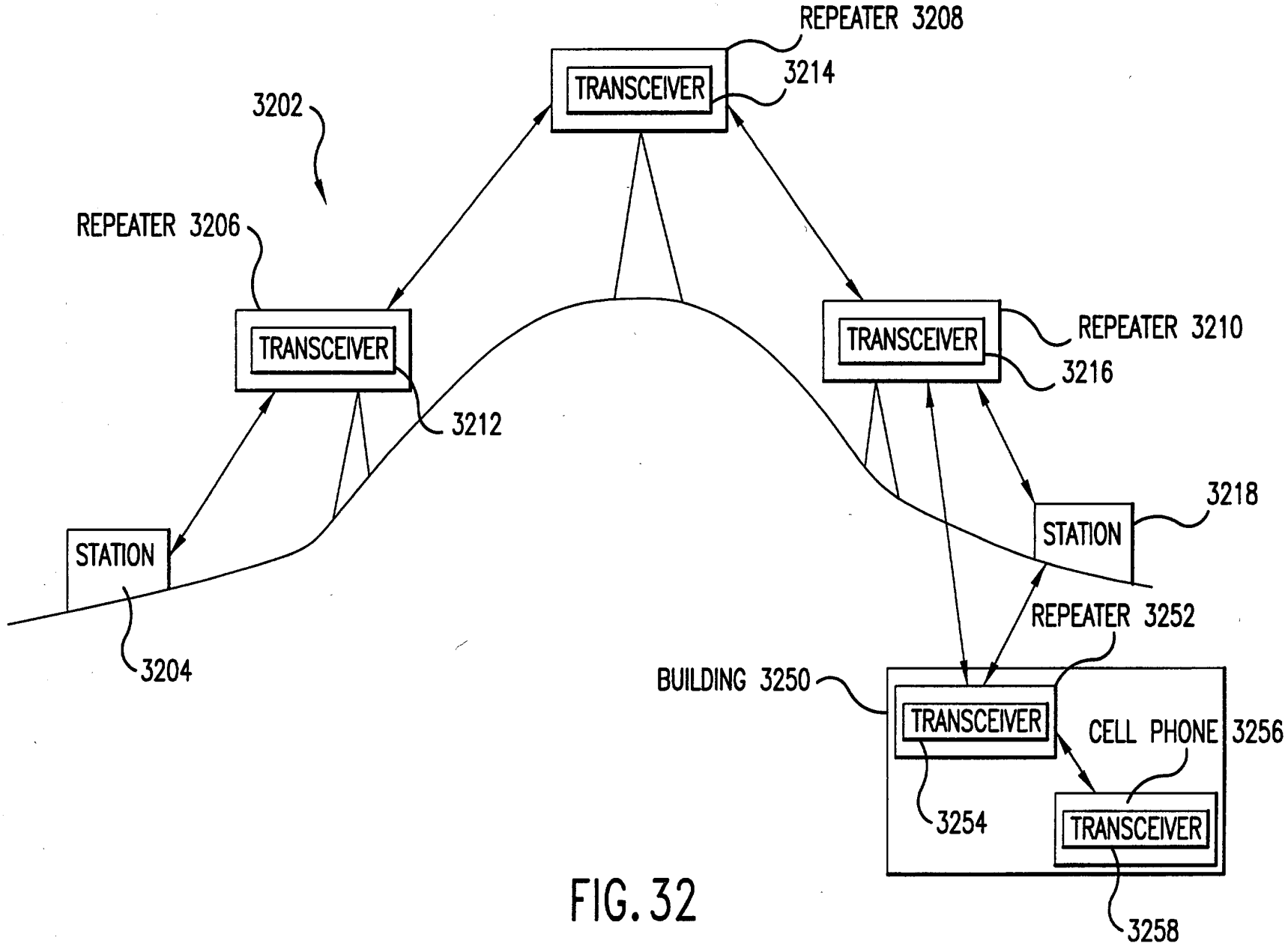

FIG. 32

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Inventors Sorrells *et al*, Tel. 202/371-2600
Title Applications of Universal Frequency Translation

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Dkt No 1744 0140006, Group Art Unit 2681
Inventors Sorrells *et al* ; Tel 202/371-2600
Title Applications of Universal Frequency Translation

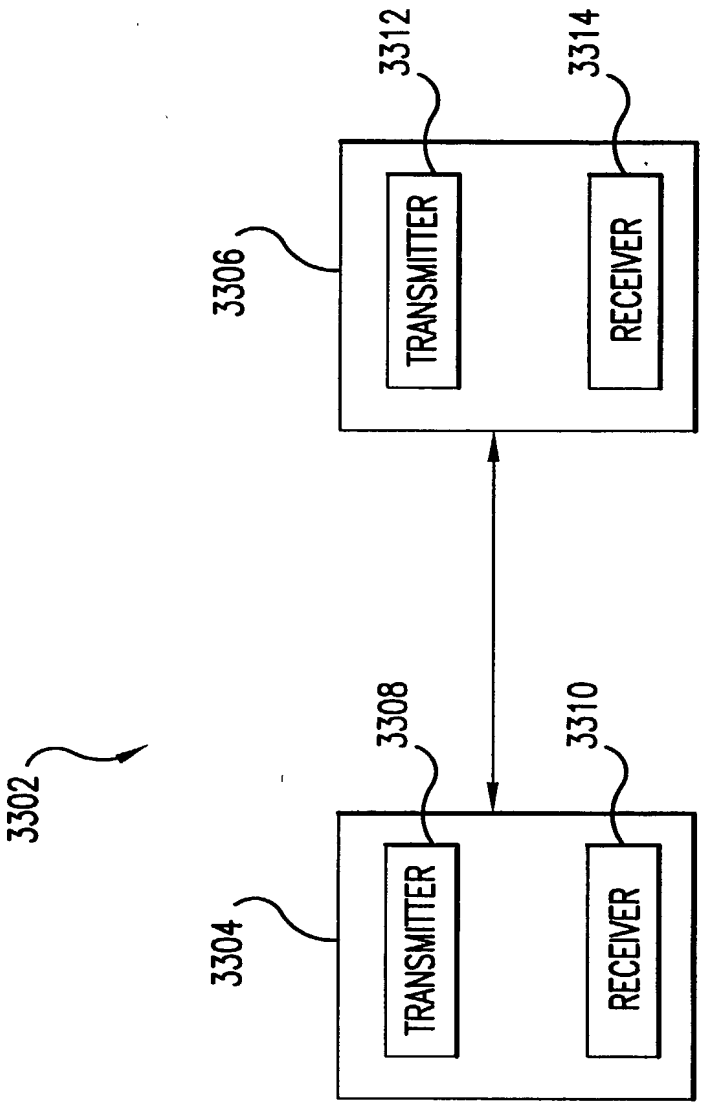

FIG. 33

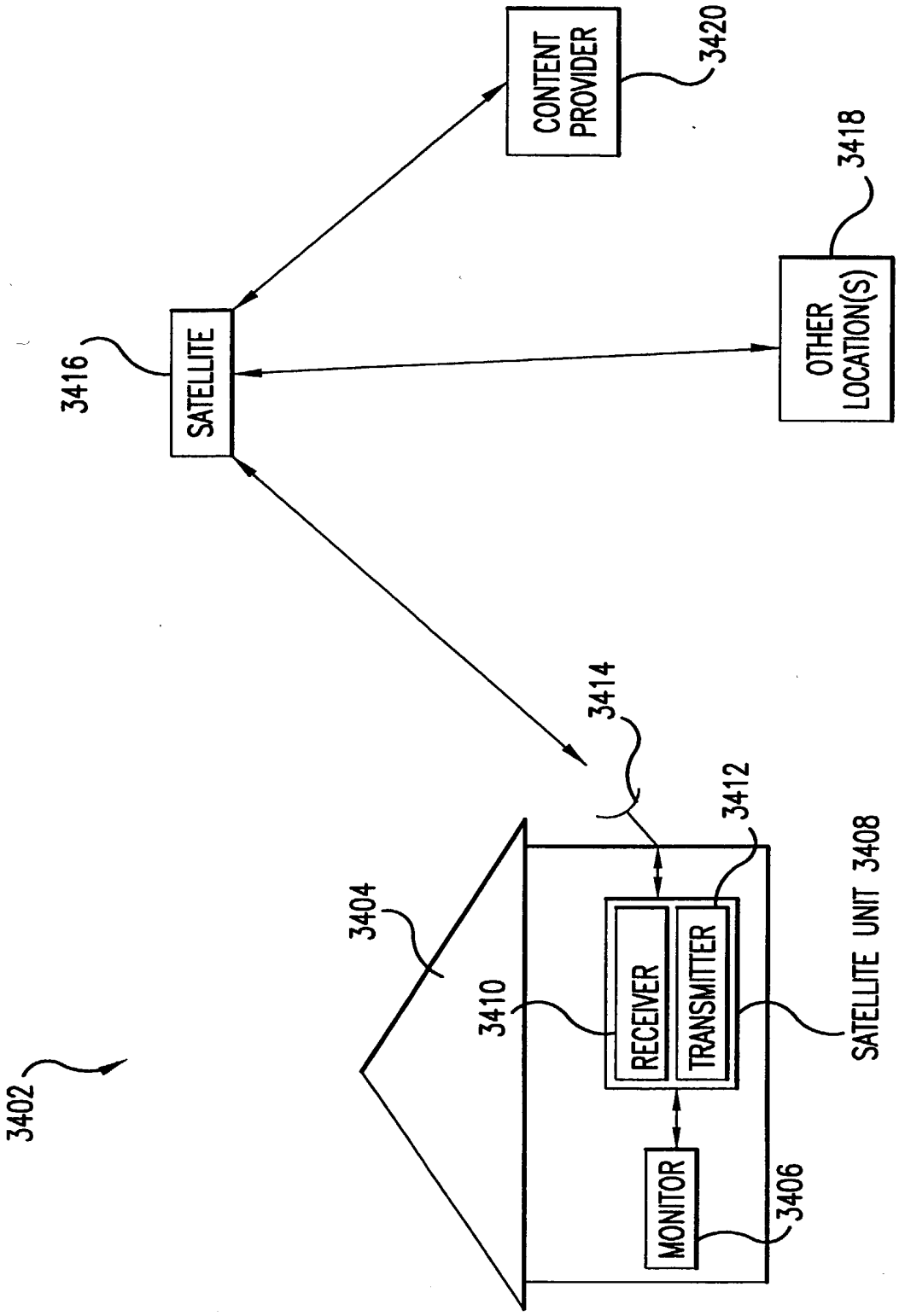
3402
3404
3406
MONITOR
3410
RECEIVER
TRANSMITTER
3412
SATELLITE UNIT 3408
3414
3416
SATELLITE
CONTENT PROVIDER
3420
OTHER LOCATION(S)
3418

FIG. 34

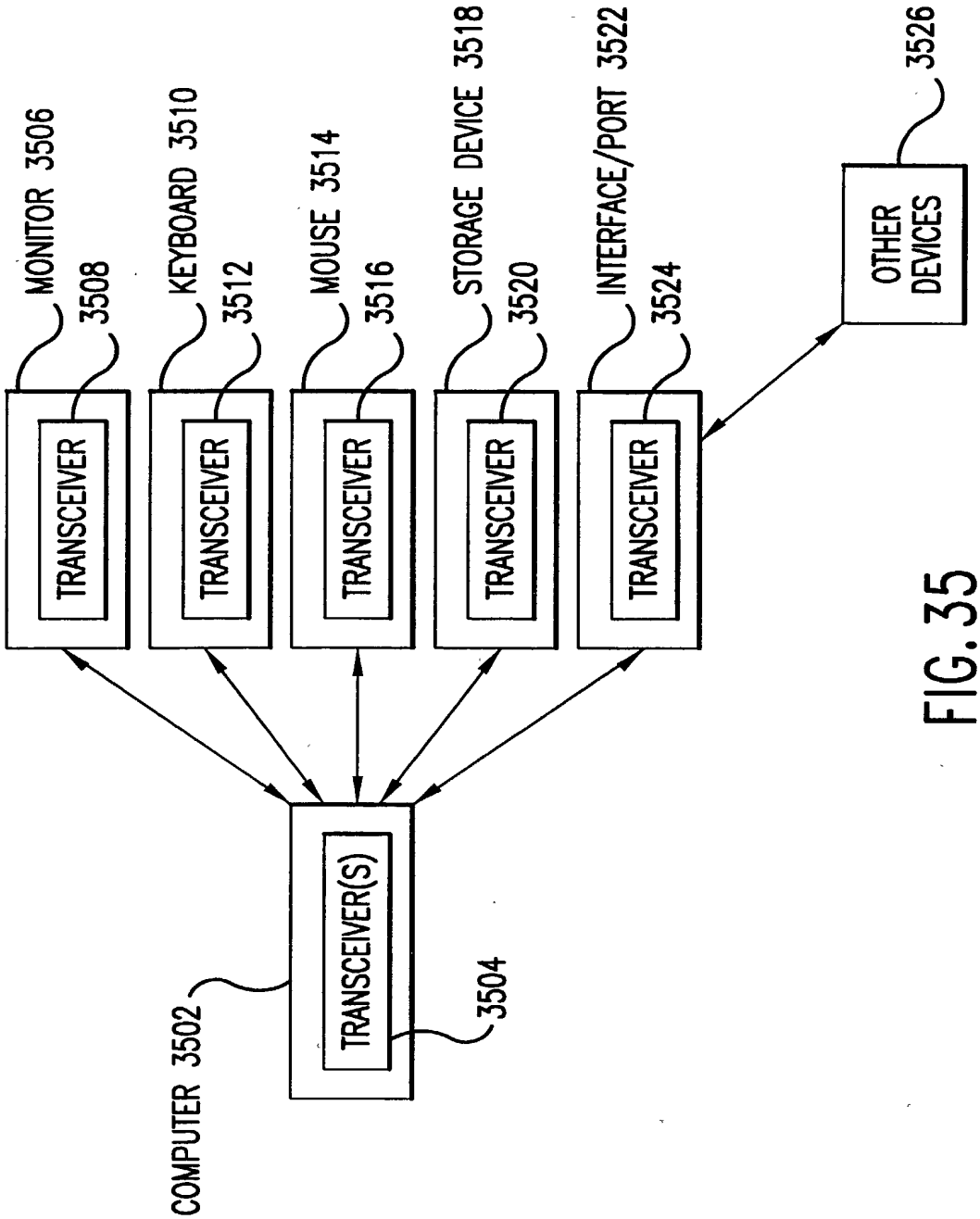
MONITOR 3506
3508
KEYBOARD 3510
3512
MOUSE 3514
3516
STORAGE DEVICE 3518
3520
INTERFACE/PORT 3522
3524
3526
OTHER DEVICES
TRANSCEIVER
TRANSCEIVER
TRANSCEIVER
TRANSCEIVER
TRANSCEIVER
TRANSCEIVER(S)
3504
COMPUTER 3502

FIG. 35

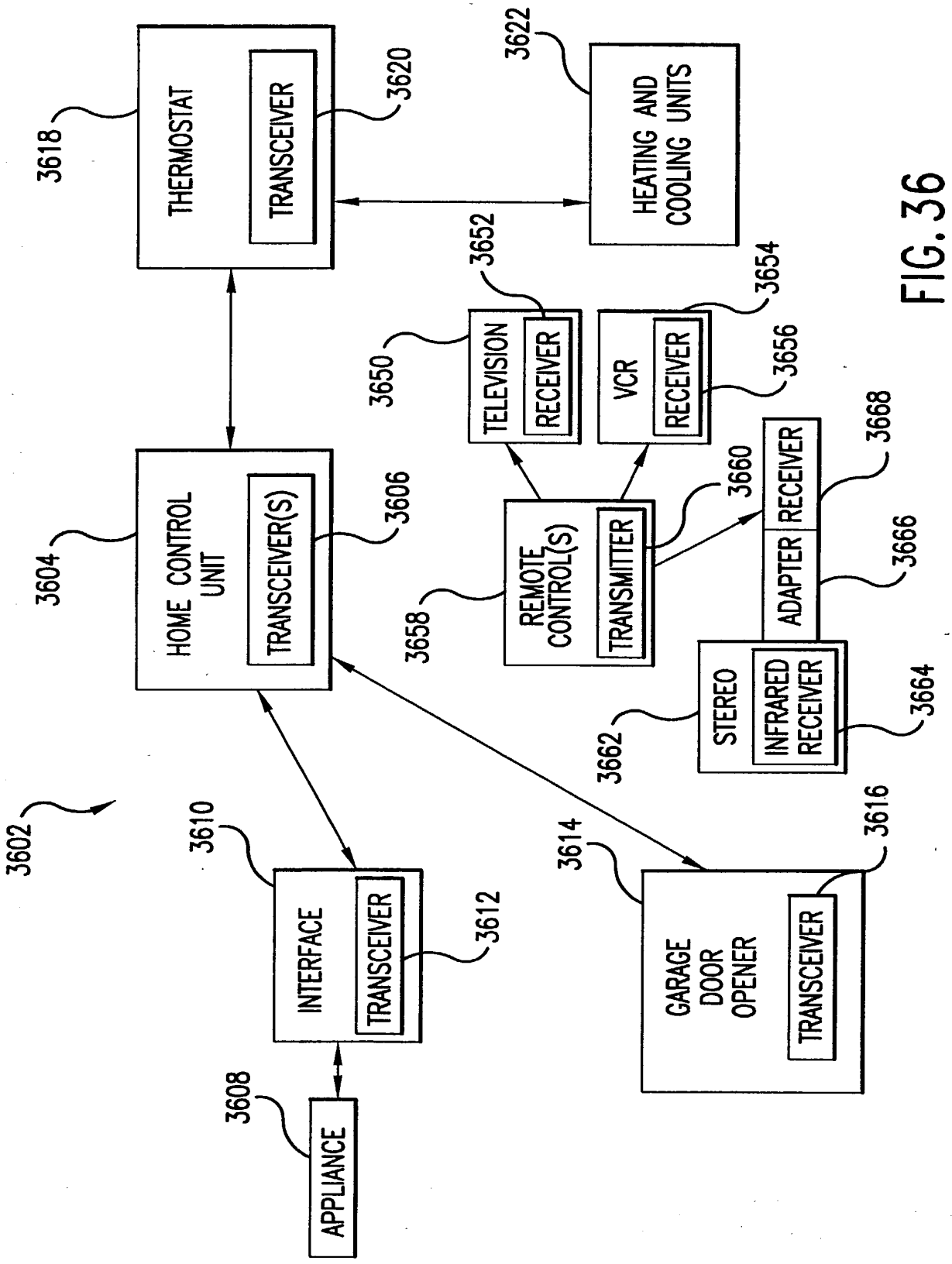
3602
3604
HOME CONTROL UNIT
TRANSCEIVER(S)
3606
3610
INTERFACE
TRANSCEIVER
3612
3608
APPLIANCE
3614
GARAGE DOOR OPENER
TRANSCEIVER
3616
3618
THERMOSTAT
TRANSCEIVER
3620
3622
HEATING AND COOLING UNITS
3650
TELEVISION
RECEIVER
3652
3654
VCR
RECEIVER
3656
3658
REMOTE CONTROL(S)
TRANSMITTER
3660
3662
STEREO
INFRARED RECEIVER
3664
3666
ADAPTER
RECEIVER
3668

FIG. 36

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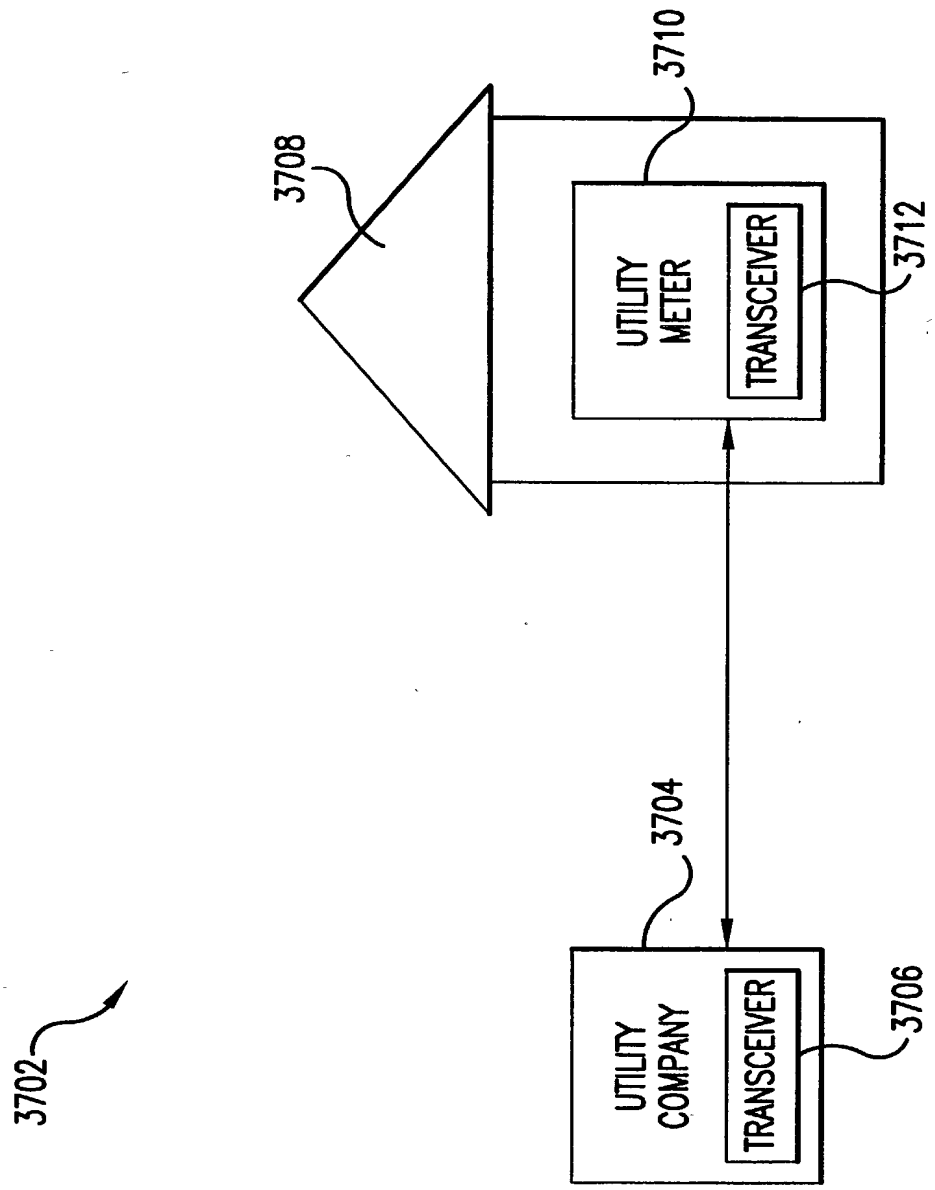

FIG. 37

Appl No 10/086,250, Filed March 4, 2002
Dkt No 1744 0140006, Group Art Unit 2681
Inventors Sorrells *et al* , Tel 202/371-2600
Title Applications of Universal Frequency Translation

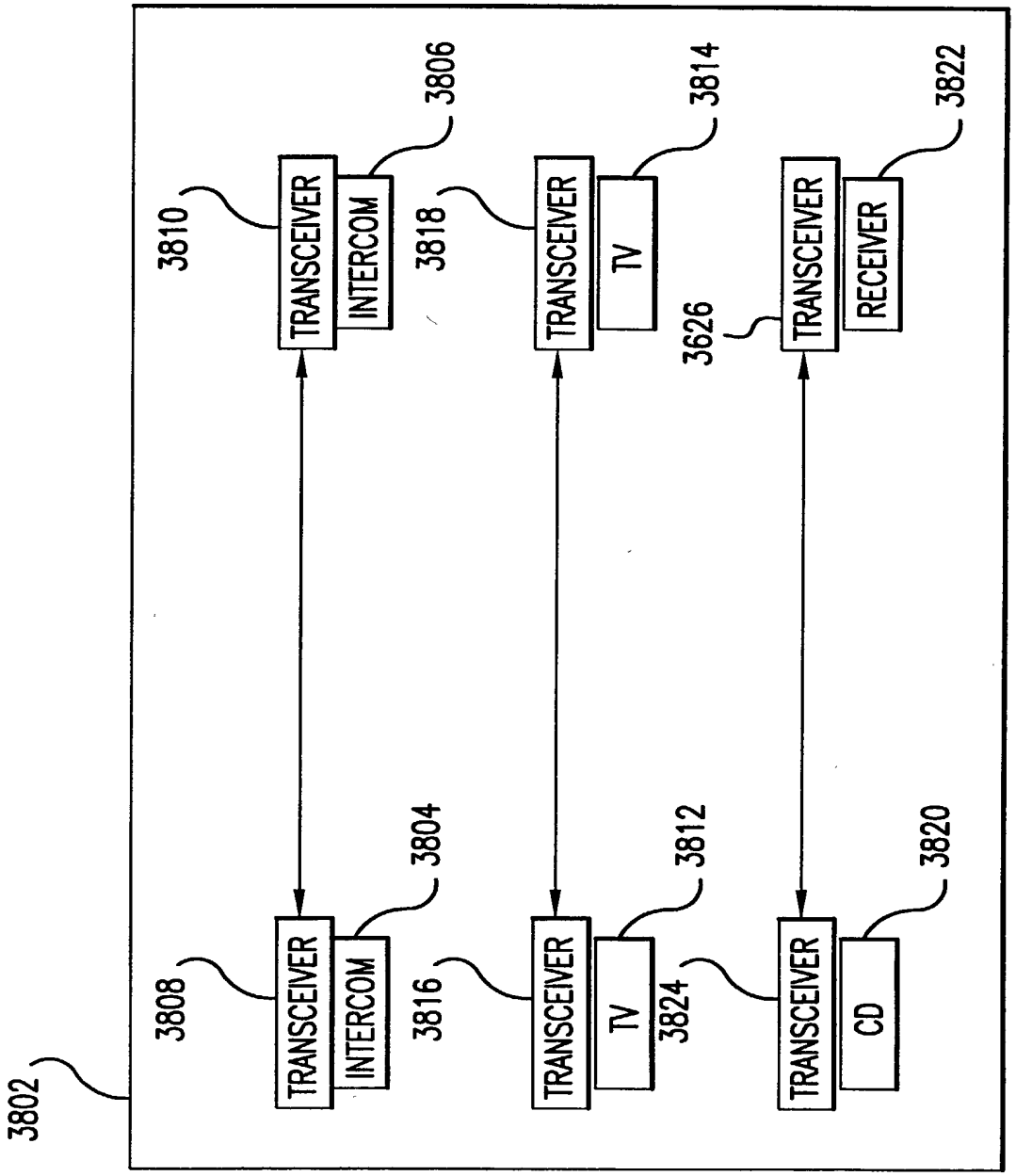

FIG. 38

Appl No 10/086,250, Filed March 4, 2002
Dkt No. 1744 0140006, Group Art Unit 2681
Inventors Sorrells *et al* , Tel 202/371-2600
Title Applications of Universal Frequency Translation

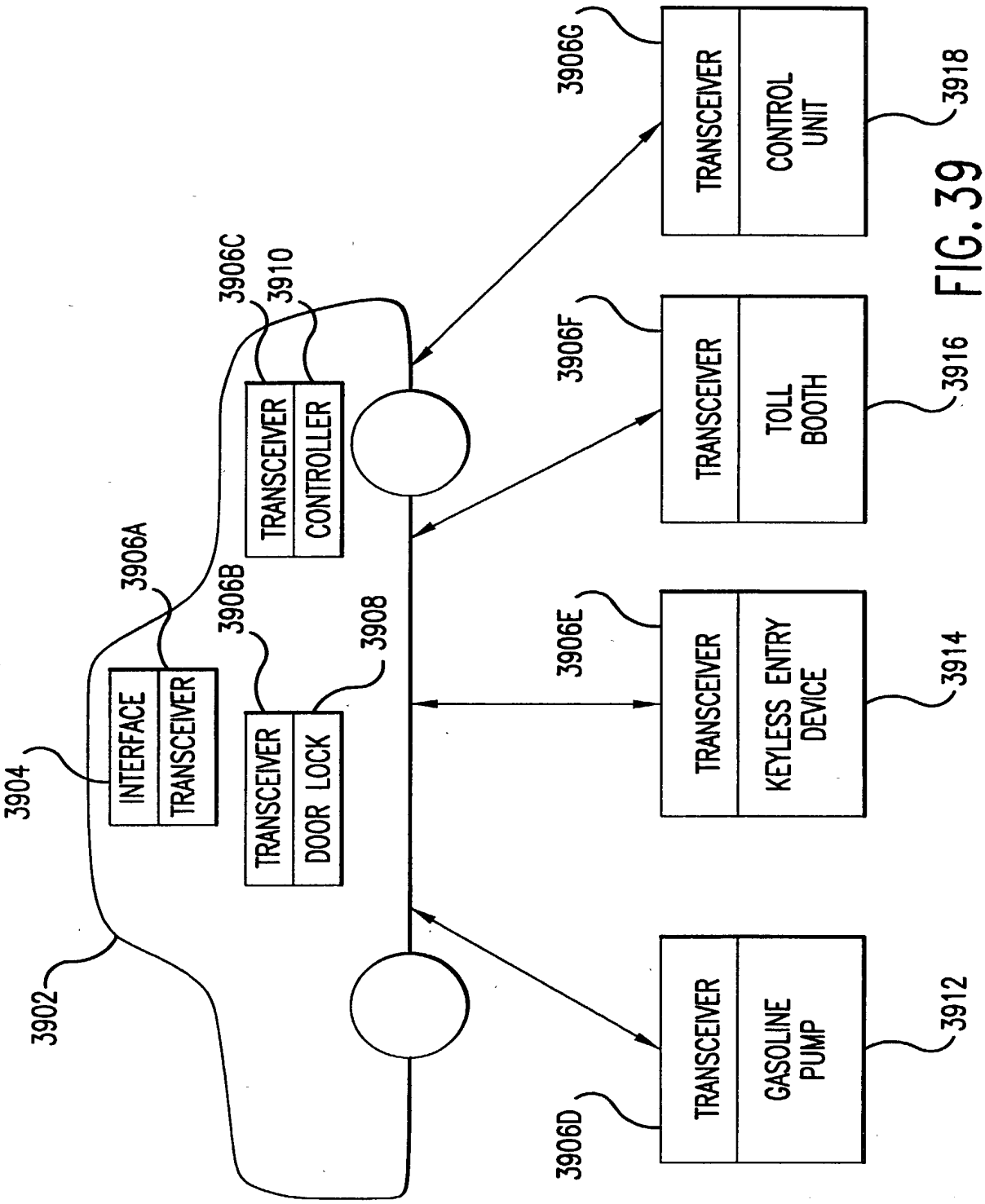

FIG. 39

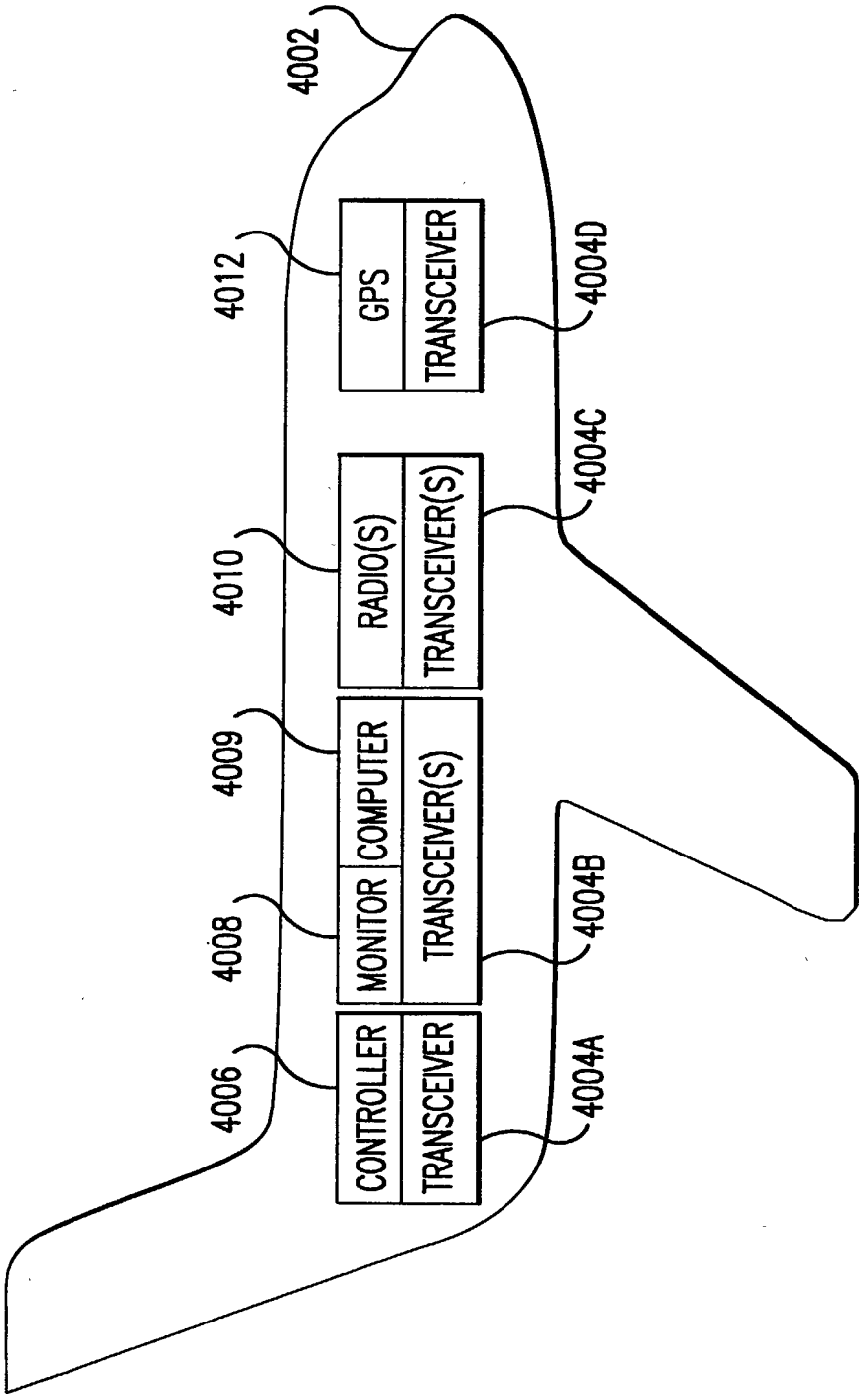
4002
4012
GPS
TRANSCEIVER
4004D
4010
RADIO(S)
TRANSCEIVER(S)
4004C
4009
COMPUTER
4008
MONITOR
TRANSCEIVER(S)
4004B
4006
CONTROLLER
TRANSCEIVER
4004A

FIG. 40A

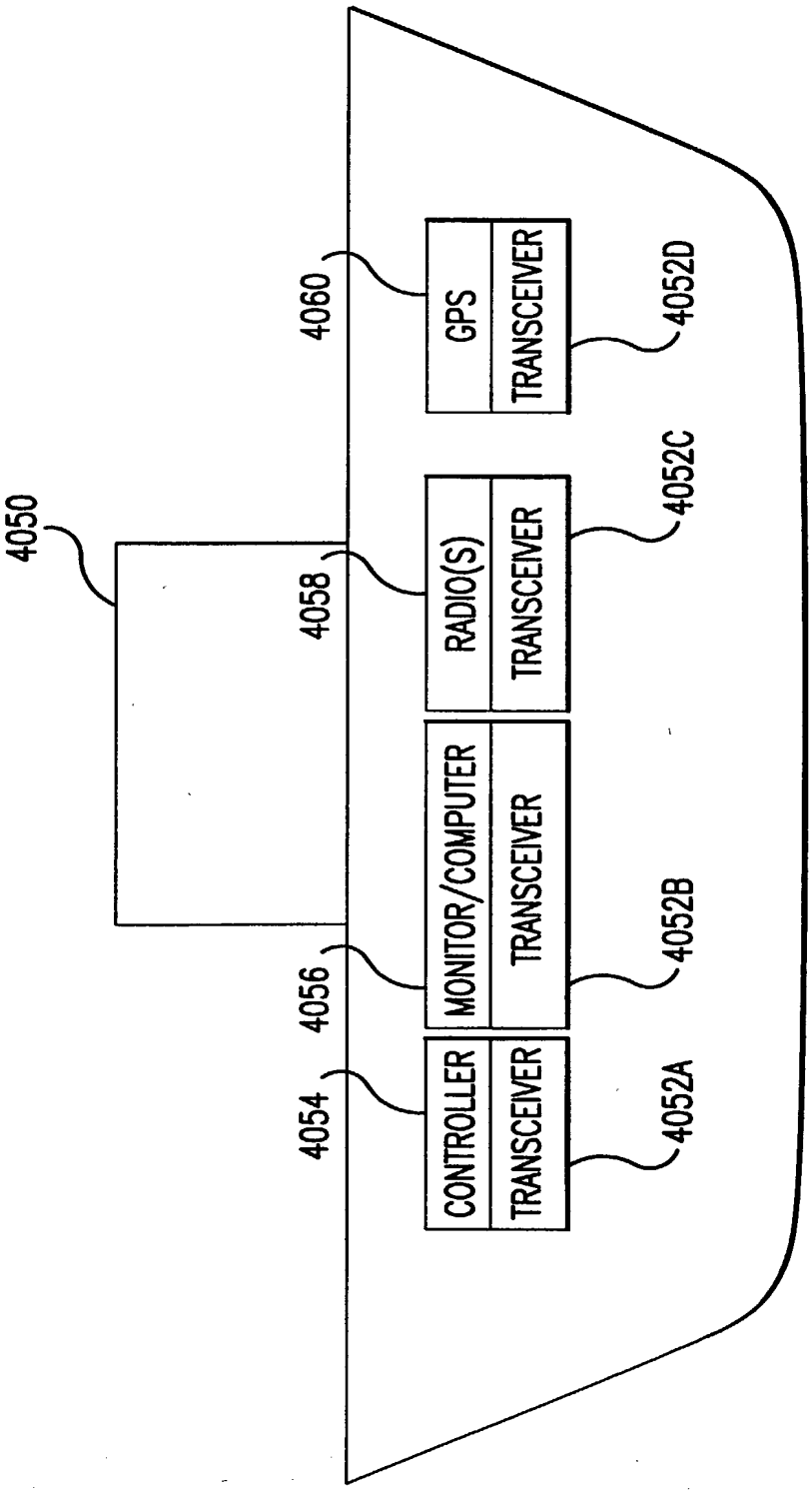
4050
4054
CONTROLLER
TRANSCEIVER
4052A
4056
MONITOR/COMPUTER
TRANSCEIVER
4052B
4058
RADIO(S)
TRANSCEIVER
4052C
4060
GPS
TRANSCEIVER
4052D

FIG. 40B

Appl No 10/086,250, Filed March 4, 2002
Dkt No 1744 0140006; Group Art Unit 2681
Inventors Sorrells *et al* , Tel 202/371-2600
Title Applications of Universal Frequency Translation

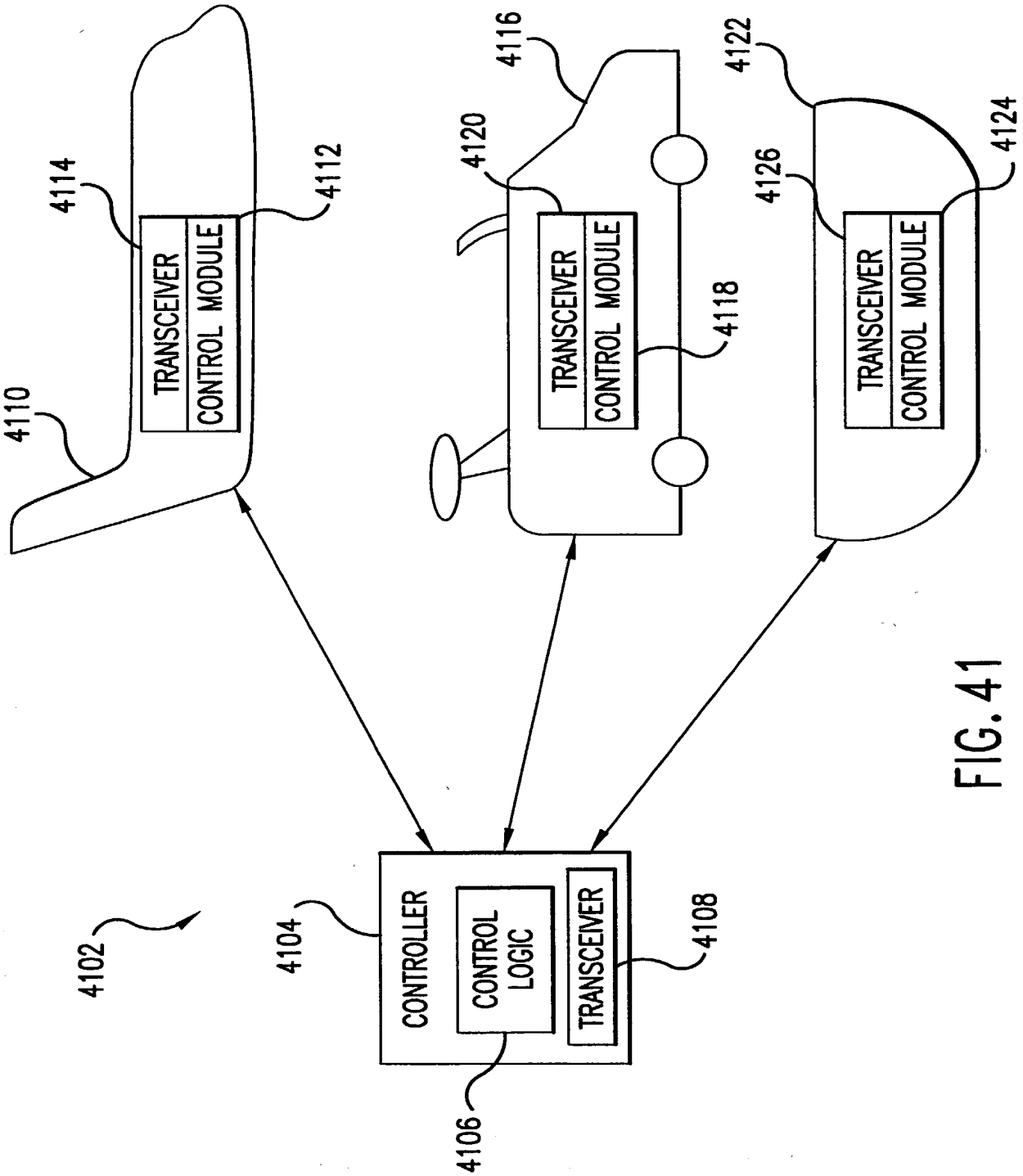

FIG. 41

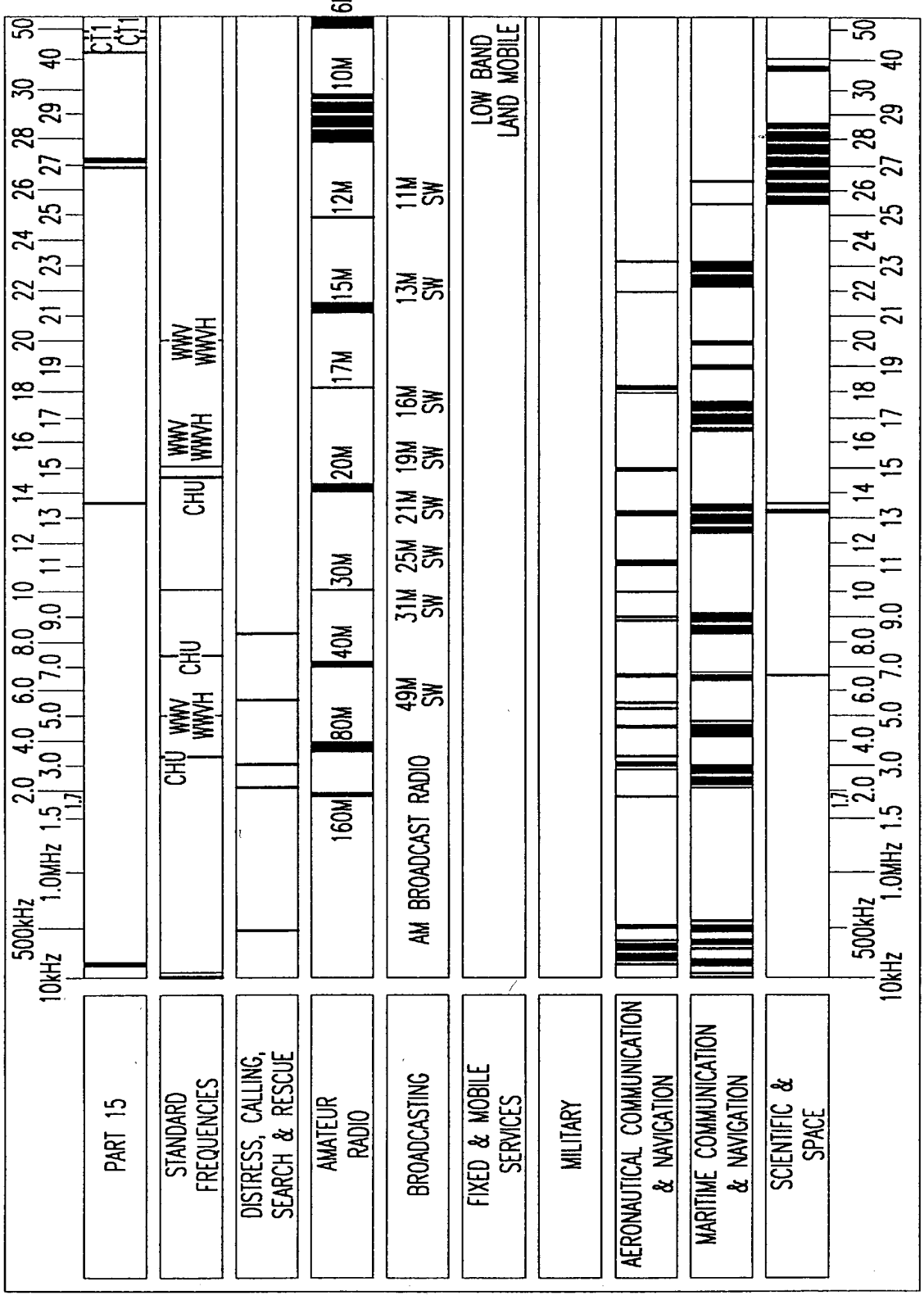
10kHz
500kHz
1.0MHz
1.5
1.7
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
40
50
PART 15
CT1
CT1
STANDARD FREQUENCIES
CHU
WWV
WWVH
CHU
CHU
WWV
WWVH
WWV
WWVH
DISTRESS, CALLING, SEARCH & RESCUE
AMATEUR RADIO
160M
80M
40M
30M
20M
17M
15M
12M
10M
6M
BROADCASTING
AM BROADCAST RADIO
49M SW
31M SW
25M SW
21M SW
19M SW
16M SW
13M SW
11M SW
FIXED & MOBILE SERVICES
LOW BAND LAND MOBILE
MILITARY
AERONAUTICAL COMMUNICATION & NAVIGATION
MARITIME COMMUNICATION & NAVIGATION
SCIENTIFIC & SPACE

FIG. 42A

Appl No 10/086,250, Filed March 4, 2002
Dkt No 1744 0140006, Group Art Unit 2681
Inventors Sorrells *et al*, Tel 202/371-2600
Title Applications of Universal Frequency Translation

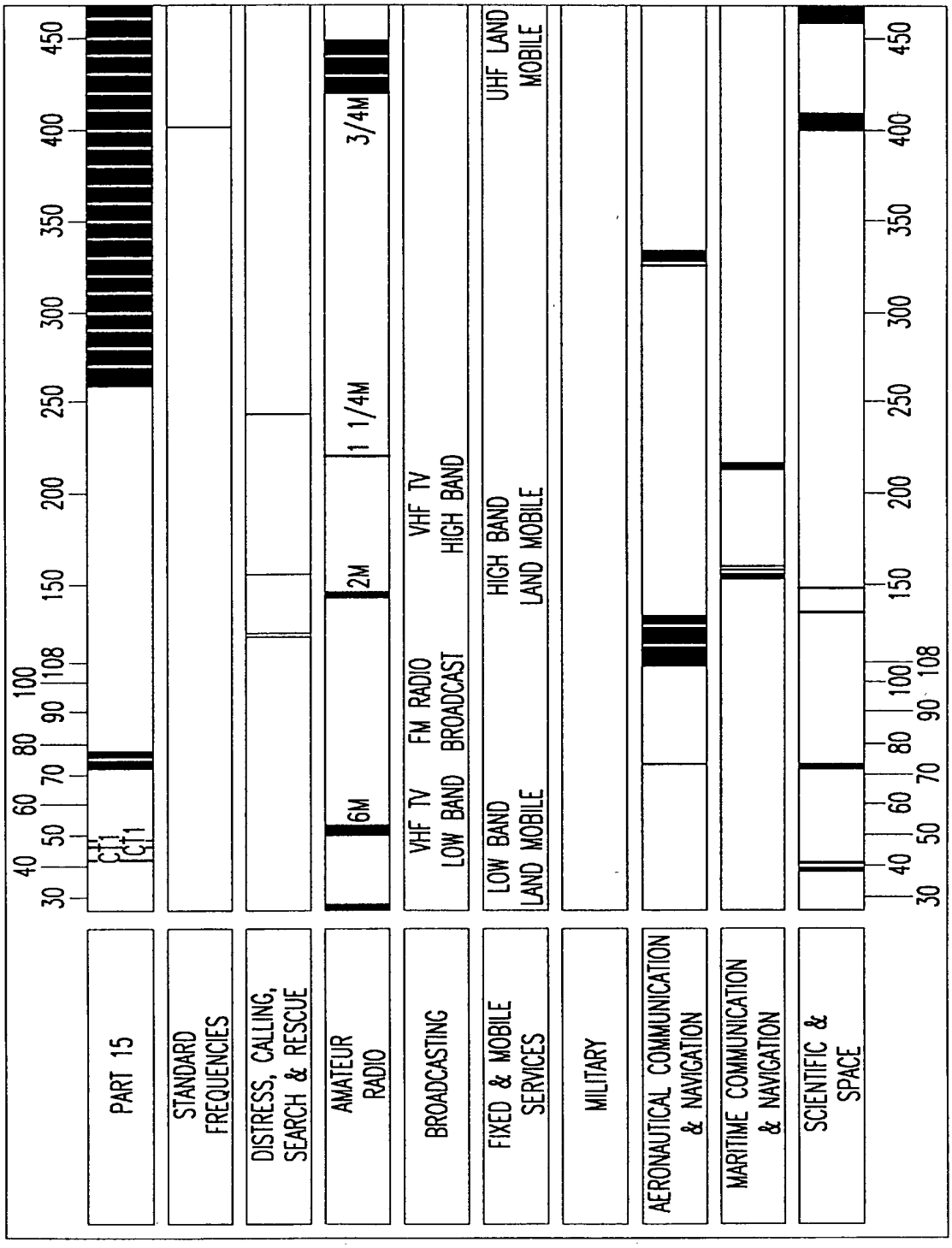

FIG. 42B

Appl No 10/086,250, Filed March 4, 2002
Dkt No 1744 0140006, Group Art Unit 2681
Inventors Sorrells *et al*, Tel 202/371-2600
Title Applications of Universal Frequency Translation

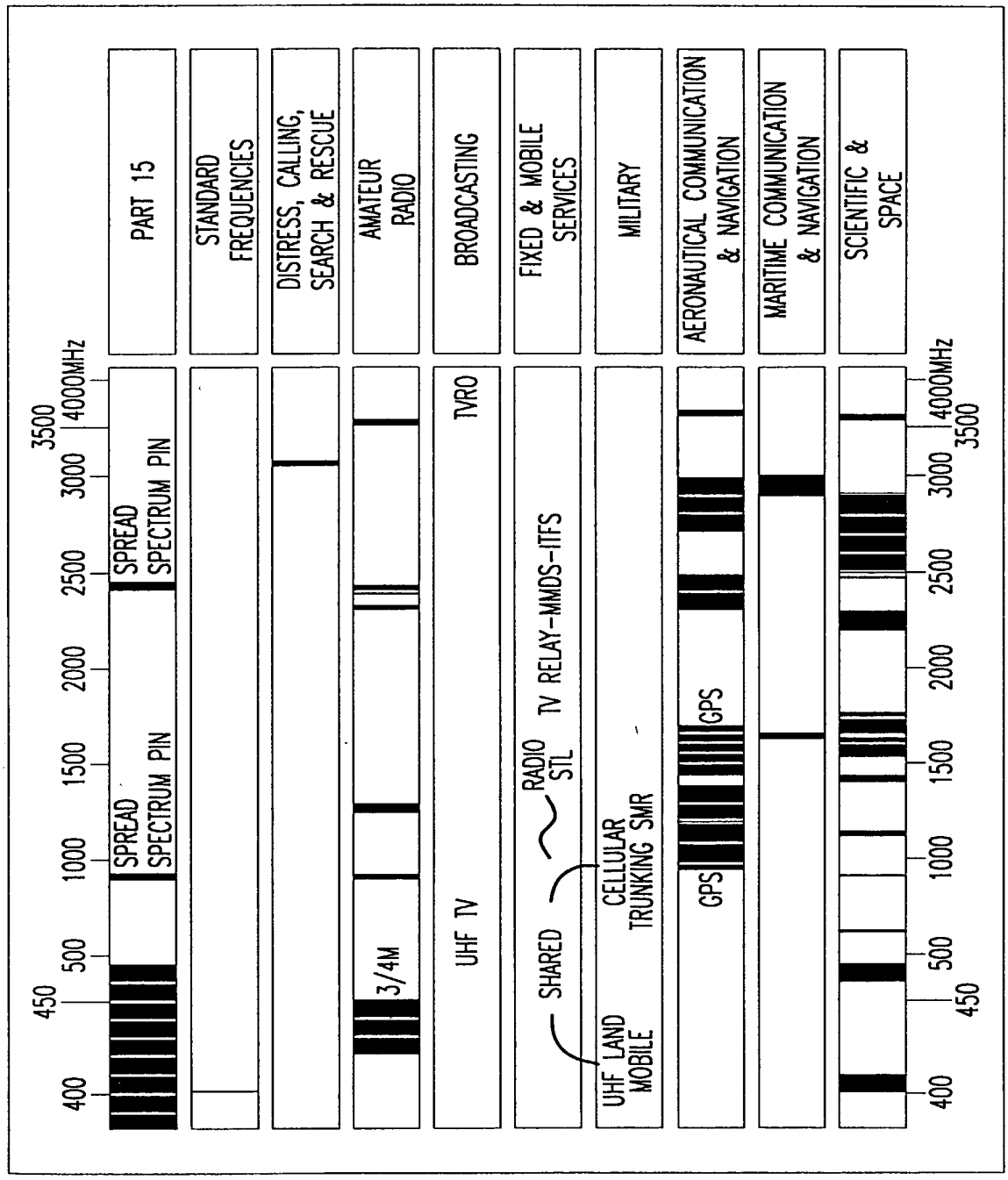

FIG. 42C

Appl No 10/086,250, Filed March 4, 2002
Dkt No 1744 0140006, Group Art Unit 2681
Inventors Sorrells *et al.*, Tel 202/371-2600
Title Applications of Universal Frequency Translation

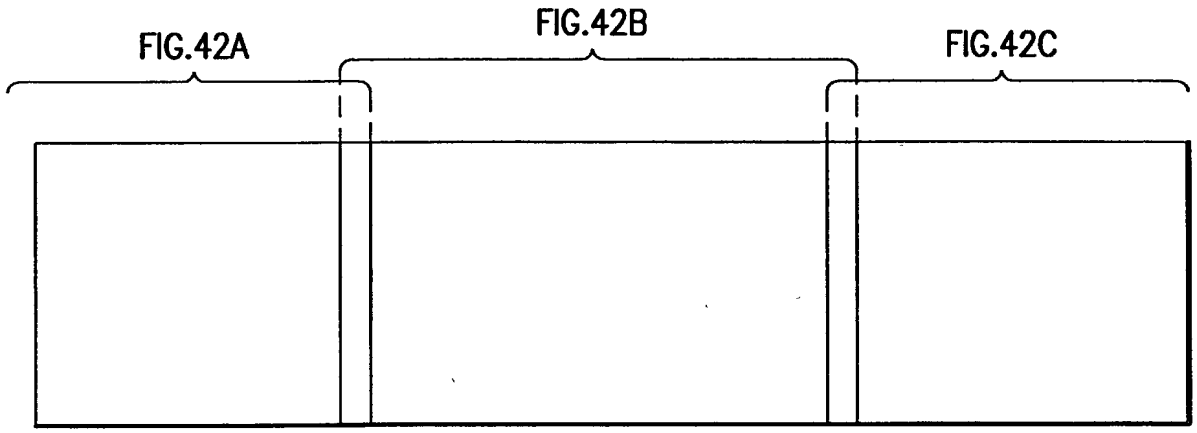

FIG. 42D

Appl No 10/086,250, Filed March 4, 2002
Dkt No 1744 0140006, Group Art Unit 2681
Inventors Sorrells *et al.*, Tel 202/371-2600
Title Applications of Universal Frequency Translation

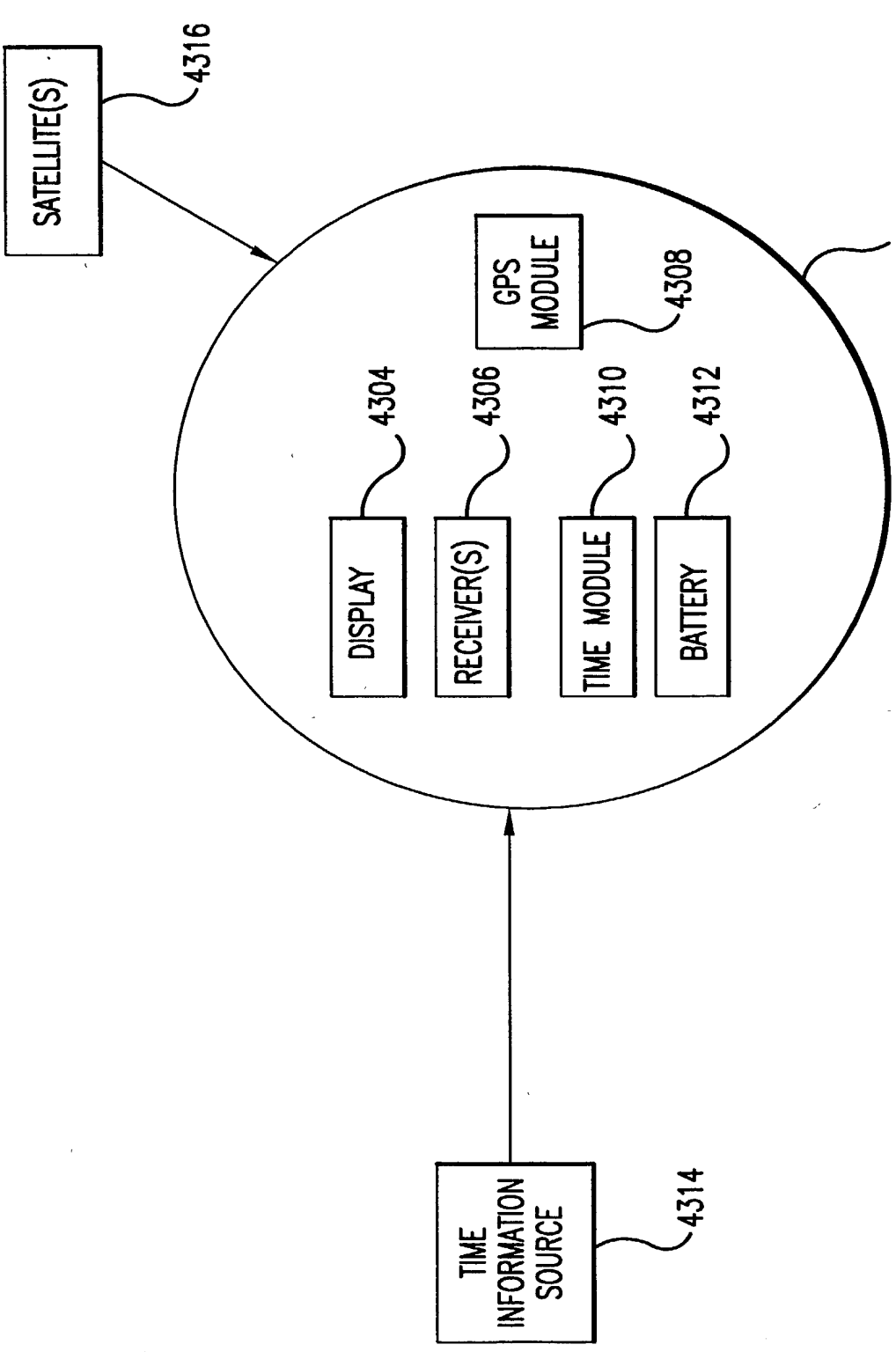

FIG. 43

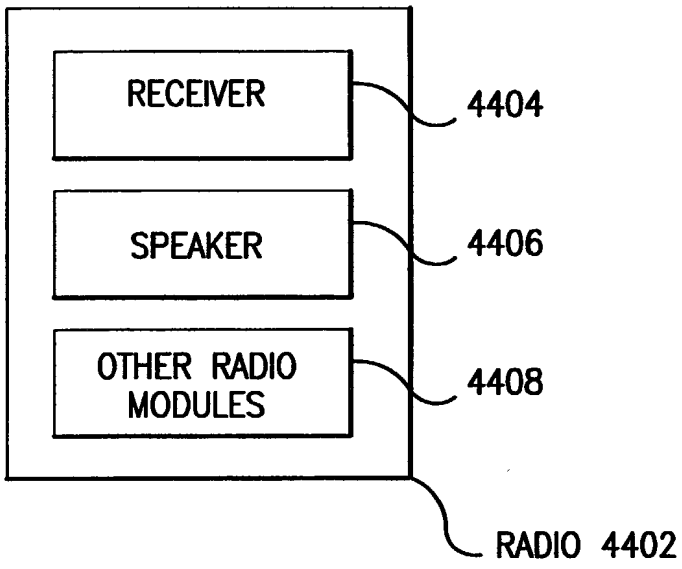
RECEIVER
4404
SPEAKER
4406
OTHER RADIO MODULES
4408
RADIO 4402

FIG. 44